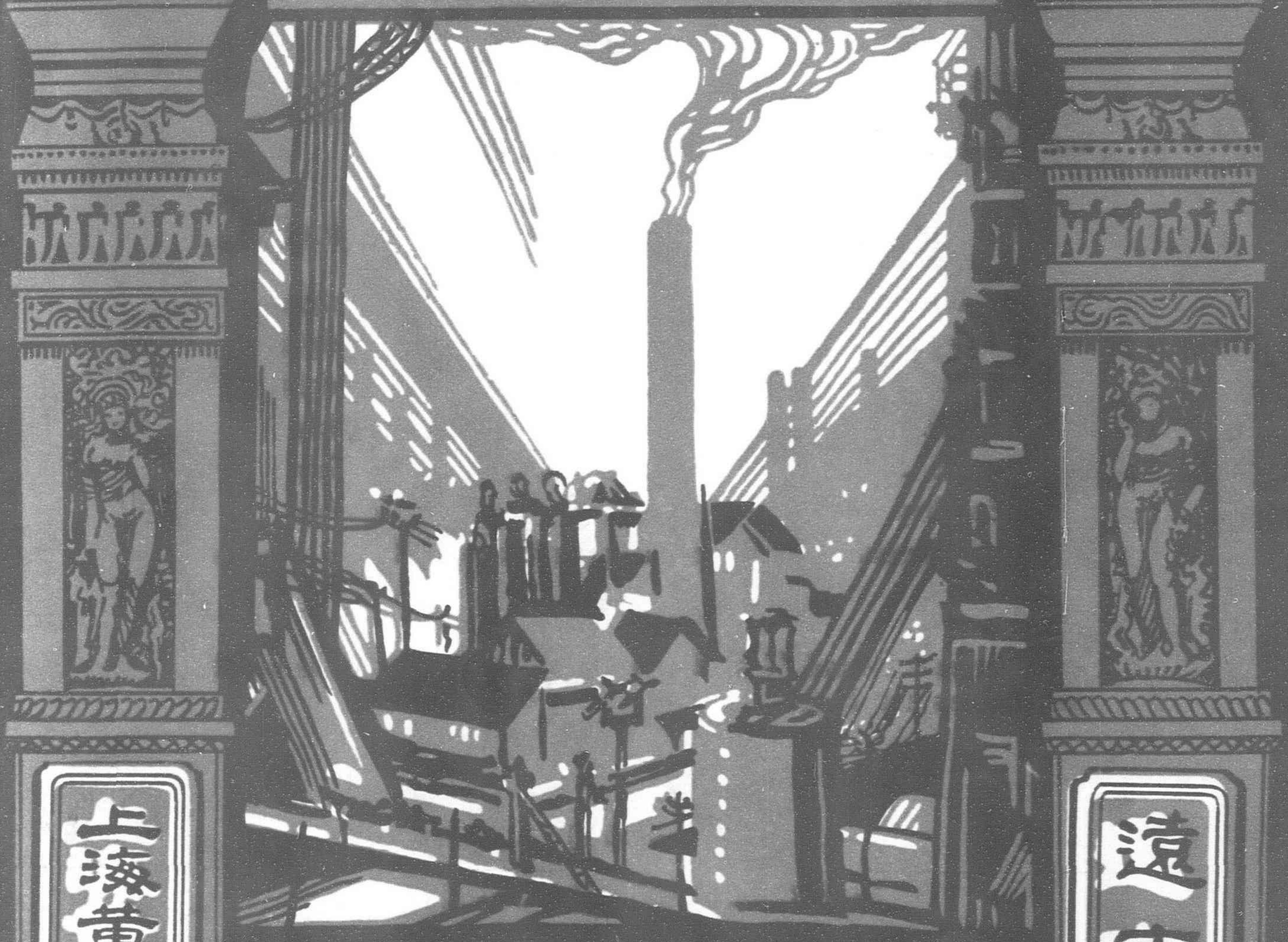


# THE FAR EASTERN REVIEW



REVIEW OF IRON AND STEEL INDUSTRY  
IN JAPAN FOR 1936

By JAMES A. RABBITT

FAIR AND WARMER  
THE DEPRESSION PASSES

上海黃浦灘金四號

遠東時報

# N. Y. K. LINE

Founded in 1885

150 Vessels

598,000 Gross Tons

Wherever you go over the ocean, comfort and excellent courteous service are always assured by the N. Y. K.'s fast and modern liners cleaving the seven seas.

## *N. Y. K. Principal Passenger Services*

|  |   |   |   |      |              |
|--|---|---|---|------|--------------|
| Orient-California Service                    | - | - | - | -    | Fortnightly  |
| Orient-Seattle-Vancouver Service             | - | - | - | -    | Fortnightly  |
| Japan-Europe Service                         | - | - | - | -    | Fortnightly  |
| Japan-Australia Service                      | - | - | - | -    | Monthly      |
| Japan-South America (West Coast) Service     | - | - | - | -    | Monthly      |
| Japan-Bombay Service                         | - | - | - | -    | Monthly      |
| Shanghai-Nagasaki-Kobe Rapid Express Service |   |   |   |      | Every 4 days |
|  |   |   |   | etc. |              |

Various Round Trip Fares quoted on very economical and convenient basis

## N. Y. K. LINE

(Japan Mail)

*Head Office: TOKYO, JAPAN*

*Shanghai Office: 31, THE BUND*

*Offices and Agencies throughout the World*

*General Passenger Agents, Cunard White Star Line in the Orient*

# The Far Eastern Review

ENGINEERING

FINANCE

COMMERCE

VOL. XXXIII

SHANGHAI, APRIL, 1937

No. 4

## Fair and Warmer

By C. J. LAVAL

**A**n intermission has come in the great international drama in the Far East, and in this period of comparative quiet the stage in China is being set for a new scene which will open when the representatives of China and Japan meet again to reopen discussions and negotiations. At the moment in the Japanese mind the Chinese question has been thrust into the background, overshadowed by the excitement of a hectic election which brought the hitherto mutually hostile major parties into an alliance against the Government, following the recent dissolution of the Diet. In the pause also Chinese aims and interests have taken new slants.

Expressions of Chinese leaders and the tone of the Chinese press leave little doubt that toward Japanese proposals for economic co-operation the Nanking Government is in a receptive mood, but it will doubtless be found when the diplomats get together again that the Chinese statesmen, with the weight of public opinion behind them, will place renewed emphasis on the condition that a solution of outstanding political questions must be found before any start toward large-scale economic co-operation can be made. It is quite possible that in a greater or lesser degree the Japanese will concede this point, for the fashion of the times in Dai Nippon, internationally, is to be gracious and conciliatory. This spirit was reflected at a recent important gathering in Tokyo sponsored by the Chamber of Commerce and convened to review and discuss Sino-Japanese relations. The conclusion was reached at this meeting that any large measure of economic co-operation of the two countries cannot be brought about until existing political difficulties are solved. Those who attended this meeting included active and retired military officers, diplomats, legislators and representatives of business interests. While accepting the Chinese contention that adjustment of political differences is an essential preliminary, the Tokyo Chamber of Commerce meeting took the view that an attitude of watchful waiting was the advisable thing at this time.

### The Problem to be Faced

When the Chinese and Japanese diplomats meet again it is probably going to be necessary, before discussion can be shifted to the tariff and related issues, to hurdle the obstacle that goes by the name of the East Hopei Autonomous Anti-Communist Government, the extinction of which Nanking has been loudly demanding, along with the cessation of that extra-legal import trade in Hopei that has put such a crimp into Chinese Customs revenues since the formation of the autonomous Hopei régime. The manner in which the Japanese may react in this connection perhaps was foreshadowed by a recent repetition of viewpoint voiced by a spokesman of the Tokyo Foreign Office, who asserted that liquidation of the East Hopei autonomous administration "cannot become an issue between Japan and China, because Japan was not concerned in the creation of the East Hopei régime."

The apprehensions of those controlling the East Hopei autonomous régime clearly have been aroused by the reported action of Nanking in urging the Tokyo Government to effect the dissolution of the Tungchow administration in Hopei as a preliminary to renewal of diplomatic discussions. This is disclosed in an appeal addressed to the Tokyo Government by Yin Ju-keng, Chief Execu-

tive of the East Hopei régime, and also by the visit to Japan late in April of a large group of officials of the Tungchow administration. It was the plea put forward by Yin Ju-keng, aimed against moves Nanking has been making, that evoked the comment set forth above by a spokesman of the Tokyo Foreign Office.

Mr. Yin Ju-keng's communication to Tokyo aims a vigorous attack against the Nanking Government, and he presents arguments in his appeal to justify the existence of the régime that he heads. These assertions that come from a puny, but strategically located state in embryo, or "bogus government," as Nanking calls it, are not without interest, since the "North China problem" distinctly is a major issue between China and Japan. The Chief Executive of the Tungchow régime asserts that the guiding principle of the Nanking Government consists of reliance upon the support of European and American powers in resisting Japan, whom Nanking regards as a hypothetical foe. The totalitarian party of the Kuomintang, Yin Ju-keng charges, is co-operating with the Communists in China and with the Russian Soviet Government, and, with the assistance of Great Britain, is monopolizing capital at the expense of the masses. China, Mr. Yin goes on, will be completely dominated by British and Soviet influences, if affairs within the country continue to drift as at present. The East Hopei Autonomous Government, he declares, came into existence "through the initiative and independent action of the masses and aims at safeguarding the integrity of the Far East through co-operation between China, Japan and Manchoukuo." On the subject of foreign trade of the East Hopei administration, through which the warehouses of Tientsin have been filled to overflowing with what Nanking calls contraband, which cannot be transported to other parts of the country, Yin Ju-keng resents Nanking's charge that this trade merely consists of smuggling. "East Hopei," he explains, has a low tariff of its own, imposed on all imports entering the territory, and the cheaper goods thus imported are highly appreciated by the Chinese masses, especially the peasants. He takes the position that questions pertaining to this trade must be adjusted directly between the Nanking Government and the East Hopei Autonomous Government.

### The Japanese Viewpoint

It may be taken as certain that the Tokyo Government has no particular interest in the East Hopei Autonomous Government, if this régime is regarded purely as an independent movement seeking to throw off the rule of Nanking, nor has the Tokyo Government any concern with domestic questions within the country growing out of the activities of particular groups. On the subject of the recent invasion into Suiyuan it has been said pertinently that the most convincing proof of Japan's disinterestedness in this affair is to be found in the circumstance that the invasion was defeated and that the invaders were thrown back by Chinese forces.

The element within China about which the Japanese Government is acutely concerned, however, is the spread of Communism and the growing strength of the Chinese Red armies. It follows, therefore, that Japan is prepared to look with favor on any developments in China or upon activities of groups of Chinese that are set up in opposition to Communism and communistic practice, particularly in North China. At the time that the spokesman of the

Tokyo Foreign Office was talking about the East Hopei régime he was at pains to emphasize that Japan did feel concern "for the maintenance of peace and order in regions contiguous to Manchoukuo."

Through almost a decade the armies of the Chinese National Government have been at war with the armed forces of communism within the country, having driven these Red armies out of the south-central portion of the country into the far western provinces that fringe China's western boundaries. This fighting has been carried on relentlessly through the years at a vast cost to China of lives and treasure. No truce has been declared in the Nanking Government's war against communism, although armed activities have come to a standstill. If the leaders at Nanking can hit upon a formula that will allay Japanese misgivings about communist activities in China and convey assurance that everything possible is being done by the Chinese Government to cope with this menace it is quite probable that the "North China issue" would evaporate, and it may be expected also that in carrying forward such a program the Nanking Government would receive all the support and aid that Japan is purported to have given in special areas of the country outside of the control of Nanking. In such a contingency it is likely that the whole problem of the East Hopei autonomous régime would become merely a domestic question with which Nanking might deal without hindrance. Some thought of this sort may have inspired Mr. Yin Ju-keng to send his appeal to the Japanese Government.

### The Record in Manchoukuo

The underlying factor in the situation is Japan's determination to keep the "bear that walks like a man" as far away from her door-step as possible, and this same reason lies behind the major portion of all Japanese activities on the Asian mainland through recent years. Out of this determination the Empire of Manchoukuo was brought into being, and, in passing, it may be a fair conjecture that the creation and development of the Manchou State to some degree has influenced the course of events in China and furnished one of the causes that has led to the progress China has been making and to the unification of the country. The record of progress of the State of Manchoukuo contains some thought-provoking implications. For example, in the historical record China began to build railways in 1876; Manchuria started railway building in 1898. China, with a territory of some 4,376,000 square miles and a population of more than 400,000,000, had about 10,000 kilometers of railways at the end of September, 1936. Manchuria, now Manchoukuo, with a territory of some 460,381 square miles and a population of about 32,000,000, had 8,800 kilometers of railways, including the South Manchuria Railway and the Manchoukuo State Railways, at the close of 1936.

Within the brief period since the State of Manchoukuo was founded, 1932 to 1937, China has built less than 1,000 kilometers of new railway lines, while in the same period Manchoukuo constructed railway lines more than two and a half times the length of new lines in China, that is, 2,570 kilometers. Railway lines under construction at present in China, including the projected Hunan-Kweichow line of 1,000 kilometers, the survey for which has not been finished, total about 2,063 kilometers. New railways at present under construction in Manchoukuo total 832 kilometers, and these lines will be completed in 1937, while an entirely new program of railway construction in Manchuria is being prepared. Freight and passenger revenues of the Chinese Government railways in the year 1935 totalled \$149,629,507, Chinese currency. Freight and passenger revenues of the South Manchuria Railway alone in the 1935-36 fiscal year totalled Y.125,774,483. The contrast in these totals is the more striking when it is remembered that the Chinese railways total 10,000 kilometers, while the total length of the South Manchuria Railway system is only 1,100 kilometers. Revenues of the Manchoukuo State Railways for the period are not yet available. The figures pertaining to the Chinese Government railways herein are taken from an article by Mr. Chang Kia-nga, Chinese Minister of Railways, published in the Silver Jubilee Edition of *The China Press* of Shanghai on October 10, 1936.

All of which would tend to indicate that Japan has proved to be a fairly good god-mother to the infant Empire of the North, for, incidentally, it is to be remarked that Manchoukuo's trade with China, in both exports and imports in 1936, was almost double

the record of trade between the two countries in the preceding year of 1935. This record reads:

### Trade Between China and Manchoukuo

|                       | Year 1935       | Year 1936        |
|-----------------------|-----------------|------------------|
| Exports to China ..   | Yuan 65,352,588 | Yuan 128,516,452 |
| Imports from China .. | ,, 31,992,899   | ,, 47,743,801    |
| Totals ..             | ,, 97,345,487   | ,, 176,260,253   |

The State of Manchoukuo, however, which has muddled along fairly successfully without recognition, has ceased to be a burning issue. The focal points of present-day differences between China and Japan are centered elsewhere. The foundations for an edifice of amity and goodwill in the Far East were laid in the recent utterances of Foreign Minister Sato in the Japanese Diet, and later were cemented by both Chinese and Japanese leaders on the occasion of the visit to China in March of an important Economic Mission headed by the Japanese financier and commercial leader, Kenji Kodama. It may not be doubted that differences of viewpoint on the subject of Sino-Japanese relations exist in both countries, but, assuredly, the air is clearer than it has been in a long while and it is not too much to expect that concrete results will grow from the renewed diplomatic exchanges shortly to take place in China.

An event of the month just passed was the visit to Japan and to Manchoukuo of a group of twelve Chinese journalists led by Mr. Chin Ta-chih, owner of the *Liu Sheng Pao*. On the occasion of a dinner that was given for the visitors in Tokyo, the Japanese viewpoint with regard to Sino-Japanese relations was clearly expressed by Mr. Eiji Amau, until recently Director of the Information Bureau of the Tokyo Foreign Office, who shortly is to assume the post of Ambassador at Berne, Switzerland.

"Speaking as a Japanese and an Asiatic," Mr. Amau said to the visiting journalists, "I must emphasize the need for a re-adjustment of Sino-Japanese relations at the earliest possible date. It cannot be denied that both nations should maintain their own national spirit, but they should not forget that they stand side by side on the same continent facing the outside world. Having so much in common, racially and culturally, the two nations should face each other with a genuine brotherly feeling, and join hands in resisting aggression by third parties."

Mr. Hsu Shih-ying, Chinese Ambassador to Japan, who is returning to his post in Tokyo in May after a period of weeks spent in China, asserted in an interview in Nanking that China has always been agreeable to the idea of co-operation with Japan, provided that it is based on the principle of mutual equality and benefit. The Ambassador voiced the belief that the "North China problem" would be the main subject of discussion when diplomatic negotiations are again resumed. He stressed the Chinese contention that political problems should first be solved before Sino-Japanese economic co-operation can be realized, and to achieve actual betterment in the relations of the two countries he held that three essentials were mutual tolerance, mutual confidence and mutual assistance.

### Question of British Participation

From time to time in discussions regarding Japanese and Chinese relations, and in news reports, the probability of British co-operation in China has been put forward. Certain observers have sought to link up British participation in Japanese activities in China with the recent departure of a Japanese Economic Mission to the United States and Great Britain. It may be enlightening to quote at some length views lately aired in the *Japan Chronicle* in connection with this Mission and its aims.

"Judging by what has been written of the coming Economic Mission to Britain," says this newspaper, "the delegation that Mr. Kadomo is heading will be able to look back on an experience not dissimilar to that of the Barnby Mission whose visit it is returning. But whilst the Barnby Mission had hoped to escape all political issues, the Kadomo Mission is deliberating courtly entanglements which will vitiate any hope there may be of improving direct trade relations between the United Kingdom and the Colonies on the one hand and Japan on the other."

"The Kadomo Mission is not especially equipped to deal with political questions, for it is not qualified to represent the Foreign Office or that military opinion which counts for so much in the

shaping of Japan's policy in Asia. Yet the press and circles closer to the Government have commented freely on the delegation's aims in a manner that leaves little doubt that politics will play a rather larger part than economics in the discussions that are to take place in London.

"The Mission is reported to have four main problems in mind. First, the question of trade between Japan and the United Kingdom; second, trade between Japan and the British Dominions and possessions; third, trade in the markets of third countries; fourth, the Japanese claims for free access to resources in the British Dominions and possessions.

"It is the third problem which is going to attract most attention, for under the heading of trade with third countries comes the vexed question of collaboration in China. Mr. Kadomo has the difficult task of convincing Britain that Japanese aims on the mainland of Asia are as innocent as the Tokyo Government has always asserted they are. Japan has no territorial designs, no wish to infringe Chinese sovereignty, and no intention whatever of disturbing the trading rights and interests of Britain or any other Power actively associated with the Chinese market and the Chinese economic structure. No one will envy Mr. Kadomo this particular task. If recent official statements in the Diet have not removed British apprehensions it is unlikely that the assurances of an unofficial Mission will meet with any greater success.

### Proof of the Pudding

"All Britain wants from Japan with respect to China is proof in deed of the friendship and assistance policy Mr. Sato is supposed to have initiated. British industry hardly expects Japan to offer a friendly division of the Chinese market, whilst the British Government is not interested in sectional and political arrangements which would tend to confirm the vicious spheres of influence which once made China the happy hunting ground of Governments who had their separate stakes on the individual war-lords. Those days have gone, one hopes, for good. Yet recent British trade enterprise in China has been interpreted in Japan as politically suspect, and this suspicion appears to be so far shared in Government quarters that it is not unlikely that the Mission will deem it its duty to commence the talks on China in the assumption that some sort of a deal can be arranged which will persuade Britain to withdraw her interest in the North in return for a freer hand in the South. If the report shortly to be published by the Mission to China does not disabuse the Mission to Britain of the possibility of any such device, the London conversations soon will.

"But it would be a pity if Mr. Kadomo is ever allowed to broach the suggestion. Certainly Britain would welcome Japanese willingness to explore the prospects of joint economic assistance to China, an assistance in which the United States, France, Italy and other signatories of the Nine-Power Pact would be invited to participate; yet this is a matter that no Economic Mission, however powerful its industrial representation, is competent to initiate. And unfortunately there has been no sign that the Japanese Government's official second thoughts on China yet embrace that renewal or revision of the Nine-Power Pact which would be necessary before an international scheme of co-operation could be adumbrated.

### The Nine-Power Pact

"Actually the Nine-Power Pact has never been denounced. Japan has repeatedly expressed the opinion that the Pact has outlived its usefulness, and considering all that has happened in China there is a strong case for agreement. But Japan has not gone so far as to abrogate the Pact, even though she has denounced the naval limitations concluded at Washington along with that Treaty. To all intents and purposes, however, the Pact has ceased to exist, and it will have to be revived in a new and better form before collaboration in China can be guaranteed its proper political security."

### Where Did This News Come From?

The Tokyo *Nichi Nichi* startled political circles lately with a minor explosion that, seemingly, has fizzled dismally. Under sensational headlines on April 21 this leading Japanese newspaper published a report that Great Britain informally had notified the Japanese Government that the British Government desired to

bring about Anglo-Japanese co-operation in China, or reach an Anglo-Japanese understanding with regard to China. The report added that diplomatic negotiations regarding China between Tokyo and London were about to begin, and that these negotiations would be conducted on a basis of stabilization of Sino-Japanese relations and normal operation of the Chinese Maritime Customs. This report also added that Foreign Minister Sato at a conference with the Minister of War and Minister of the Navy had spoken of the necessity of ameliorating relations between Japan and Soviet Russia, adding further that the effecting of Anglo-Japanese co-operation in China is vital for the adjustment of Sino-Japanese relations. To all of these things General Sugiyama, Minister of War, and Admiral Yonai, Minister of the Navy, assented, the *Nichi Nichi* said in conclusion. On the same day the spokesman of the Tokyo Foreign Office smothered this report effectively with an emphatic denial of its truth and declared that the *Nichi Nichi* in publishing it was "creating fiction." In other authoritative quarters of the Tokyo Government further denial was given to the report. Undoubtedly, the thing is fictitious. Nevertheless, it would be interesting to know precisely what led the *Nichi Nichi* to publish the story.

Based upon the recent cessation of hostilities between the Nanking Government forces and the Communists, the unification of anti-Japanese elements in China and certain movements of Mr. Dimitry M. Bogomoloff, Soviet Ambassador to China, the *Shanghai Mainichi* in the middle of April published another arresting news report, which thus far lacks substantial confirmation, but yet may contain elements of actuality. According to this report the Moscow Government is striving to create an "international anti-Japanese front" by means of a Far Eastern security treaty, offering in exchange for this a pledge from the Soviet Government "to respect the vested interests of the United States, France and Great Britain in China." This project was to be put forward vigorously, the *Mainichi* report asserted, at a conference in Nanking between Dr. Wang Chung-hui, Chinese Foreign Minister, and Mr. Bogomoloff, when frank views also would be exchanged between the Soviet Ambassador and representatives of the American Government, Great Britain and France.

In connection with the foregoing report it is said that the Soviet Government is seeking to inject into a proposed Sino-Soviet commercial treaty important political considerations. Mutual agreement of views on the proposed commercial treaty were reached some time ago, it is understood, but China has been hesitating to sign the treaty fearing unfavorable repercussions abroad. Under changed conditions of the present day it is thought that the Moscow Government now sees little to gain from a purely commercial treaty with China and therefore desires to revise the proposed terms of the pact so that its nature will be altered in such fashion that all the Pacific powers will be brought into an alignment opposed to Japan.

### Ambassador Kawagoe's Views

Mr. Shigeru Kawagoe, the Japanese Ambassador to China, sailed from Shanghai for Tokyo on April 28, following a recent stay in Nanking. Before his departure he expressed the opinion that there are no reasons for concern over the future economic relations of Japan and China. Economic co-operation, the Japanese Envoy said, will naturally follow readjustment of relations. With reference to China's desire to abolish the East Hopei anti-Communist Autonomous Government, and to put a stop to the extra-legal foreign trade in that régime, he intimated that the Chinese authorities appeared ready to make concessions in this connection on the question of the import tariff. China, he asserted, is interested in the readjustment of relations with Japan just as much as is Japan, and there is no divergence of views between Nanking and Tokyo on the necessity of breaking through the existing impasse. Through mutual relations alone, he affirmed, can China and Japan hope to readjust their affairs. Both nations, he added, must realize that their relations can only be harmonized through concerted action.

"There can be no readjustment," he explained, "if one party seeks to realize its own program, and that alone. It must be borne in mind that these are negotiations between two parties, and one cannot have its way exclusively. There is no other way to achieve success but through the harmonization of mutual desires."

"I have repeatedly told Dr. Wang Chung-hui that what China needs most is a clear realization of the factors involved in

(Continued on page 153)

# Review of Iron and Steel Industry in Japan for 1936

By JAMES A. RABBITT

**O**N page 29 of Dr. H. Foster Bain's remarkable book on the Ores and Industry in the Far East is given a map showing that of the world's supply of minerals forming the basis of modern industry, the countries of the Far East furnished:

|  |     |
|--|-----|
| Antimony (China) .. .. .. ..                       | 80% |
| Tungsten (China) .. .. .. ..                       | 63% |
| Tin (Malaya, Siam, Dutch East Indies and China) .. | 66% |
| Copper (Japan) .. .. .. ..                         | 5%  |

and aside from the foregoing no single Eastern country furnished more than 1 per cent of the world's output of any other mineral; and that collectively all Far Eastern countries furnished 4 per cent of the coal and less than 2 per cent of the steel made in the world.

The most striking feature of Dr. Bain's map in connection with the industrial development of the Far East, and particularly Japan, is the paucity of available iron in Japan. This shortage in the supply of the main sinew of industry would be taken as a discouraging factor in industrial development by any other nation in the world except Japan. What the industrialists of this country have done in the phenomenal development of their iron and steel industry, and, in many cases, other metals, is to accomplish what has been thought the obviously impossible feat of pulling themselves up by their boot straps.

In Japan, owing to the paucity of minerals already referred to, much of the development in the metals industry depends largely upon the business acumen of the Japanese people in obtaining suitable ores or basic materials from other countries.

Economically it is a mistake to estimate the natural resources of any country in terms of minerals only, and this is especially applicable to Japan, which is rich in several of the very important factors which form the basis of industrial development, such as an abundant supply of power and labor, plus a high standard of courage and intelligence capable of technical direction and the rational utilization of the available natural resources to the utmost degree.

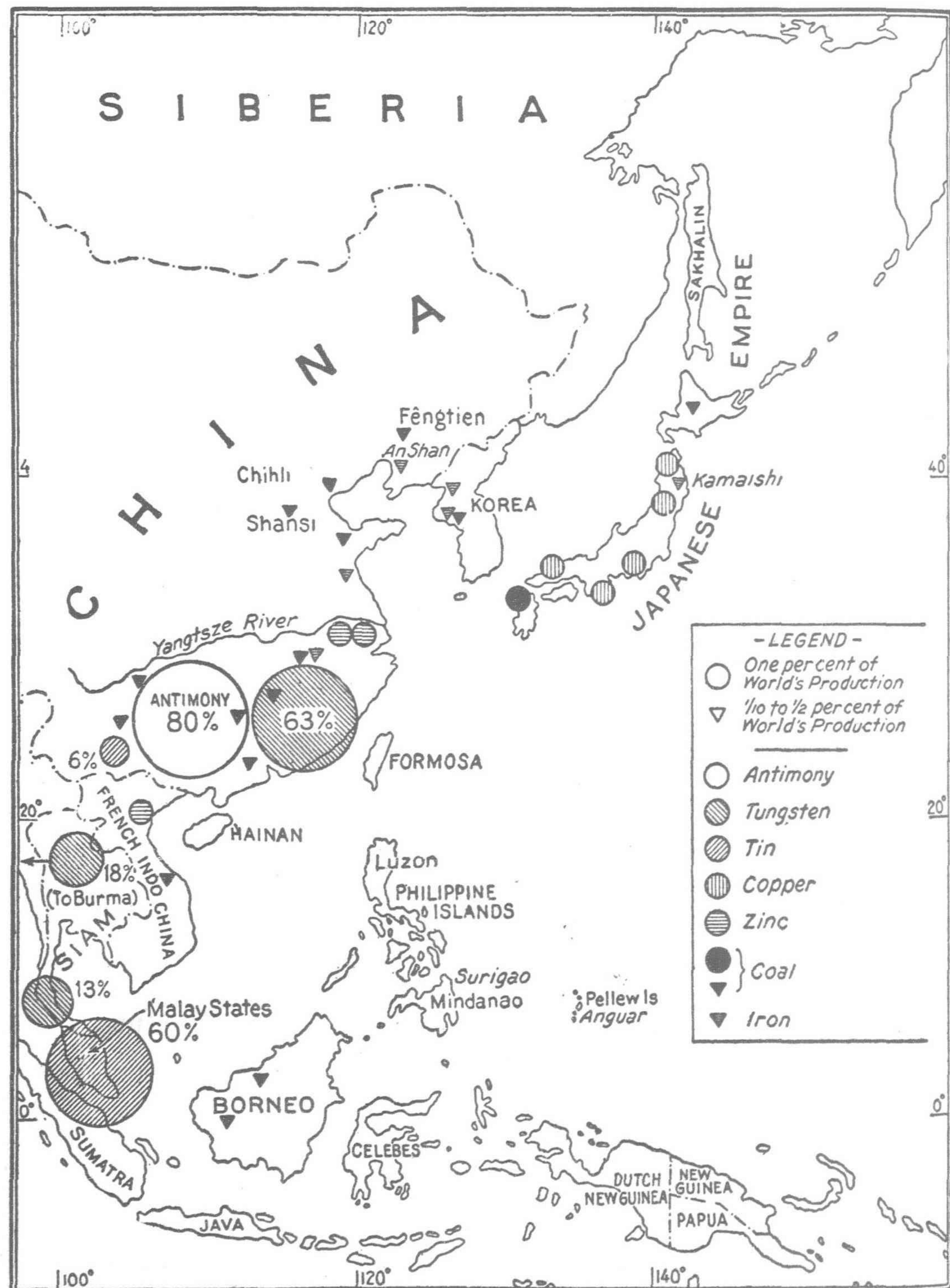
Another factor which makes the abundant labor of this country a national asset is provided by a dense and increasing population, supported by a simple and frugal standard of living, and backed by a national spirit of co-operation carrying a minimum of dissent and a maximum of contentment, all of which must be listed on the asset column of national resources to offset any deficiency in raw materials.

In the review which follows an attempt was made to balance the

statistical quantities, but it had to be abandoned because of the difficulty in obtaining complete statistics from one source.

The first part of this review is based upon the reports issued by the Department of Commerce and Industry in February, and the latter part, particularly the summary, is based on final statistics released by the research department of the Japan Iron Manufacturing Company and the Government Committee on Iron and Steel Industries in March, as this article goes to press.

No attempt has been made to adjust the differences between these later releases and the quantities given in the February releases.



Map reproduced from H. Foster Bain's Work, "Ores and Industry in the Far East," showing the Percentage of World's Production of Various Minerals Derived from Far Eastern Countries in 1924.

## Iron Ore

The limited extent of iron ore reserves in Japan proper is probably responsible for the previous lack of a vigorous policy in the domestic mining of iron. The domestic production of iron ore in 1935 was only 563,000 tons, while Korea furnished 600,000 tons and Manchoukuo 1,500,000 tons, making a total of 2,663,000 tons, which was almost equalled by the imports from Australia, the Malay Peninsula, the Philippine Islands and China, amounting to 2,500,000 tons.

If the present extension scheme for increasing the pig iron production to 6,500,000 tons by 1945 is carried out, it will be necessary to provide iron ore to the amount of 9,740,000 tons if a maximum of 25 per cent, or 1,625,000 tons, of scrap iron is used. If this plan had been made at the end of 1934 it would have been difficult to understand how the demand for the increased requirements of ore could be met, as the increase of the total supply of ore in 1934 over 1929 was only 825,098 tons, but as will be noted from the accompanying table of iron ore supply, even by taking the domestic, Korean and Manchoukuo output as stationary since 1934, the total supply of ore has increased since 1934 from 4,287,916 tons to 6,443,109 tons, or an increase in the past three years of 50 per cent, due mostly to an increase in imports, which registered an advance of approximately 85 per cent in the same period. It is, however, not intended to maintain the *status quo* in domestic production, but according to the present program the ore output of Japan proper, Korea and Manchoukuo is to be increased to 3,000,000 tons annually, which will mean an increase of approximately 350,000 tons over the present output from these three sources. This plan includes acquisition and exploitation by the Japan Iron Manufacturing Company of all the larger mines now owned by private firms, and leaving the investment in foreign mines to private interests.

The program for domestic supply also includes the encouragement of the refining of poor grade ores and iron sand from many parts of the Empire which have hitherto remained undeveloped and the reserves of which are estimated to be from 80 to 100,000,000 metric tons in such places as Kuji in Iwata Prefecture and Shibokita in Aomori Prefecture. It is intended that the Nippon Iron Works will exploit these deposits with Government aid.

Successful recovery of iron from iron sand has already been achieved by the Nippon Iron Sand Engineering Company, which is at present working on a commercial basis. Starting in 1934 with an initial capital of Yen 3,000,000, Yen 2,525,000 paid up, this firm owns a large mine at Tanegashima Island in Kagoshima Prefecture, with reserves estimated at 100,000,000 tons of 30 per cent ore. The refining plant is located at Takasago in Hyogo Prefecture and it is now successfully treating 20 tons per day.

There have also been recent applications of the successful treatment of low grade ores by the Udozo Rotary Calciner or direct refining method by which ore with an iron content as low as 30 per cent may be roasted to obtain an intermediate product that may be used as a substitute for scrap iron. It has been stated that there are reserves of such ores amounting to 600,000,000 tons at Anshan, 300,000,000 tons at Penhsifu, 300,000,000 tons in Mozan, Korea, and 15,000,000 in Kamaishi in Japan Proper.

Along the same lines Dr. Tsunesaburo Umetsu, of the Showa Steel Works, was recently decorated for his invention of an iron refining process known as the "Reducing and Roasting Process," which has been in operation by the South Manchuria Railway since 1922, and more recently by the Showa Steel Works for commercially treating low grade hematite from Anshan with an iron content not exceeding 35 per cent and which is at present producing 350,000 tons of pig iron annually. This patented process is unique and consists of crushing hematite, which is treated in a roasting furnace with coke gas and reduced to a semi-metallic product with magnetic properties which becomes brittle when immersed in water. This product is later pulverized and the metallic substances are recovered by magnetic separators, resulting in a concentrate of 60 per cent iron which is easily refined into pig.

In addition to the foregoing, it is intended to maintain the present supply from the Yangtse Valley in China to increase the supply from Lung Yen in North China and also to increase the imports, if possible, from Kelantan in the Malay Peninsula, Yampi Sound Island in Australia, and the Philippines, and to prospect additional supplies from Siam, French Indo-China, Sumatra, Dutch Borneo, the Celebes and New Caledonia.

Summarizing these new additional domestic reserves, it will be noted that there are available approximately 1,215,000,000 tons of low grade ore from which to draw on for a 350,000 ton increase in the domestic production of pig iron. Hence it is quite apparent that the present extension program can easily be carried out as far as the domestic supply of pig iron is concerned; and from what has been done in the past few years on increasing pig iron imports, it is not at all unreasonable to assume that further foreign sources can be tapped within the next few years.

It is interesting to note that the percentage of self-supply of iron ore has been increasing for more than 15 years. The average percentage for the years 1920 to 1929 inclusive was only 7.5 per cent. For the years 1930 to 1935 inclusive this was raised to 11 per cent.

TABLE I.—SUPPLY AND DEMAND OF IRON ORE IN JAPAN  
(in metric tons)

Based on data in the Seitetsu Sanko Shiryo (Reference Book for Iron Manufacture), published by the Tekko Kyokai (Iron and Steel Institute, Japan), 1935 issue and 1936 issue.

| Year  | *Domestic Production | Imports   | Imports from Colonies | Supply Total | Exports | Consumption (Domestic) | Domestic Production in Total Consumption |            |
|-------|----------------------|-----------|-----------------------|--------------|---------|------------------------|--|------------|
|       |                      |           |                       |              |         |                        | Balance                                  | Percentage |
| 1912  | 152,983              | 198,211   | 123,405               | 474,599      | —       | 474,599                | 32                                       |            |
| 1913  | 153,101              | 279,896   | 142,420               | 575,417      | —       | 575,417                | 27                                       |            |
| 1914  | 121,636              | 298,868   | 162,044               | 582,548      | —       | 582,548                | 21                                       |            |
| 1915  | 118,955              | 308,788   | 201,978               | 629,721      | —       | 629,721                | 19                                       |            |
| 1916  | 139,953              | 279,791   | 190,225               | 609,969      | —       | 609,969                | 23                                       |            |
| 1917  | 267,594              | 296,881   | 120,907               | 685,382      | —       | 685,382                | 39                                       |            |
| 1918  | 378,114              | 360,930   | 236,611               | 975,655      | —       | 975,655                | 39                                       |            |
| 1919  | 362,949              | 621,086   | 333,521               | 1,317,556    | 2,656   | 1,314,900              | 28                                       |            |
| 1920  | 314,858              | 662,368   | 332,533               | 1,309,759    | 8,075   | 1,301,684              | 24                                       |            |
| 1921  | 86,977               | 578,056   | 190,541               | 855,574      | —       | 855,574                | 10                                       |            |
| 1922  | 39,744               | 818,510   | 89,827                | 948,081      | —       | 948,081                | 4  |            |
| 1923  | 55,174               | 893,260   | 95,390                | 1,043,824    | —       | 1,043,824              | 5  |            |
| 1924  | 57,922               | 1,065,132 | 136,727               | 1,259,781    | —       | 1,259,781              | 5  |            |
| 1925  | 75,765               | 1,103,709 | 107,868               | 1,287,342    | —       | 1,287,342              | 6  |            |
| 1926  | 130,420              | 792,830   | 98,992                | 1,022,242    | —       | 1,022,242              | 13                                       |            |
| 1927  | 159,005              | 937,488   | 168,764               | 1,265,257    | —       | 1,265,257              | 13                                       |            |
| 1928  | 157,706              | 1,616,974 | 225,389               | 2,000,069    | —       | 2,000,069              | 8  |            |
| 1929  | 177,556              | 1,944,786 | 314,134               | 2,436,476    | 4,299   | 2,432,177              | 7  |            |
| 1930  | 245,991              | 1,973,659 | 287,727               | 2,507,377    | 2,466   | 2,504,911              | 10                                       |            |
| 1931  | 208,181              | 1,549,919 | 176,585               | 1,934,685    | 5,176   | 1,929,509              | 11                                       |            |
| 1932  | 226,722              | 1,482,409 | 151,604               | 1,860,735    | 4,252   | 1,856,483              | 12                                       |            |
| 1933  | 320,670              | 1,523,627 | 255,320               | 2,099,617    | 5,620   | 2,093,997              | 15                                       |            |
| 1934  | 431,681              | 2,131,916 | 180,511               | 2,744,108    | 5,539   | 2,738,596              | 16                                       |            |
| 1935† | 515,865†             | 3,404,099 | 242,197               | 4,162,161    | 5,714   | 4,156,447              | 12                                       |            |
| 1936§ | 797,000              | 3,828,000 | 650,000               | 5,275,000    | —       | 5,275,000              | 15                                       |            |

\* Japan Proper.

† Exports to Colonies alone.

‡ Consists of 577,000 metric tons of iron ore proper and 220,000 metric tons of sulphuric acid slugs.

§ The figures for 1936 are from the "Tokyo Asahi," March 28, 1937, and "Nikkan Kogyo," March 29, 1937 (the original figures were released by the Government Committee on the Iron Industry Law on March 27, 1937).

## Pig Iron

The domestic production of pig iron in 1936, including Korea, as published by the Department of Commerce and Industry, amounted to 2,219,049 metric tons, which was an increase of 108,132 tons over 1935. In Manchoukuo the production amounted to 649,811 metric tons, an increase of 40,867 tons over 1935, thus making a production of 2,868,860 tons of pig iron under direct Japanese control against the iron requirements for the year of approximately 5,500,000 tons, and leaving a shortage of about 2,650,000 tons, which had to be made up by the imports of pig iron, scrap and ingots, which amounted to 2,675,772 tons.

There was practically a famine in the pig iron market toward the end of the year due to various causes, such as the increase in export steel prices in Europe and the reduction of exports of American scrap iron, a reduction of exports of Soviet pig iron, and, in addition to these factors, government demand for iron to make up the excess of steel production during the year, and, added to all of these, a wave of speculation and stock hoarding owing to the rise of steel prices by over 100 per cent during the last two months of the year.

The shortage was further aggravated by the fact that there are practically only three large companies with complete facilities for producing pig iron for their steel production—that is, Japan Iron Manufacturing Company, Japan Steel Pipe Company, and Asano Dockyard Company. The rest of the steel manufacturers

are equipped with open hearth furnaces only. The three companies are producing steel by the use of approximately 80 per cent of pig iron and 20 per cent of scrap, but in the companies which are equipped with open hearth furnaces about 50 per cent scrap is used and the balance of pig iron.

It will be apparent that this situation does not permit domestic pig iron to go into the market, as the three producing companies use practically the entire supply for their own steel production.

Another aggravating factor is the inability of the Japan Iron Manufacturing Company to increase its price for pig iron commensurate with the general advance in the open market, due to the pig iron price control policy of the Government. In order to avoid selling the iron in the market at less than the market price, it became necessary to use their entire production for steel. Further, as the Japan Iron Manufacturing Company enjoys more or less of a monopoly of the supply of domestic pig iron to the local market, it was almost impossible for private companies to obtain permits from the Ministry of Commerce and Industry to erect new blast furnaces.

To remedy this situation, a Five-Year Plan was drafted for increasing the supply of pig iron and providing a domestic pig iron production sufficient to meet the country's needs. This plan starts in 1937 with the addition of furnaces in five different units, amounting to a total capacity of 2,400 tons daily, and having an annual production capacity of 840,000 tons, but producing in 1937 only 365,000 tons. The Five-Year Plan envisages a total increase in the country's daily furnace capacity by the end of 1941 to 9,550 tons with an annual production capacity of 3,430,000 tons by the end of that year. Thus it will be seen that this increase, added to the present domestic pig iron production, including Korea, of 2,219,049, will amount to 5,649,049 tons. A further extension program is proposed by which the domestic pig iron production will be raised to 6,500,000 tons by 1945.

Of the 3,130,744 metric tons of pig iron consumed by Japan last year, it will be seen that 2,219,049 tons were produced domestically. In other words, the proportion of self-supply was about 70 per cent, as compared with an average of 65.5 per cent average for the years 1930 to 1935 inclusive, and 59.9 per cent for the years 1920 to 1929 inclusive.

### Cast Iron

Statistics on the production of cast iron are meagre owing to the difficulty of obtaining accurate data from the large number of small foundries which are engaged in this industry. It is a well-known fact, however, that, owing to the progress and prosperity of the machine tool industry during the past five years, there has been a great advance in this field during that period.

The estimated requirements in 1930 were placed at 500,000 tons, although the "Tokyo Nichi Nichi" estimated the production for 1934 at 379,500 tons. Recent statistics indicate that the demand for 1936 was approximately 750,000 tons.

While Japan's metallurgical advance in steel making is more spectacular than the advance in the production and use of modern high grade alloy cast iron, there has been, nevertheless, continuous progress in the latter industry. The work at the Tohoku Imperial University by Drs. Honda, Murakami and Hamazumi, the work of Dr. Ishikawa of the Casting Society, Dr. Tawara of the Tokyo Imperial University, and Dr. Taniguchi of the Imperial Steel Works, have been applied to industry, so that at the present time the production and application of nickel and nickel-chromium cast irons is progressing in Japan at a rapid pace. Castings have been improved and tensile strength has been raised, so that where this material is used in heavy machinery produced in this country to-day, particularly in large Diesel engines, the same qualities are attained in many cases as are to be found in the finest equipment produced in Western countries.

### Scrap Iron

Japan has led the industrial countries of the world in the use of scrap iron for attaining its quota in steel production. The "Iron Age" states that "during the depression a considerable portion of the scrap trade was saved from extinction by heavy export demand, principally from Japan, which has continued during the past year (1936) in only slightly modified degree, thereby

contributing to some extent to higher prices and potential scarcity in the United States."

The price trend has been constantly upward, being \$13.33 in the United States in January, \$14.75 by February 25; and although it got back to \$12.67 in June, it advanced later to \$16.75 late in September, and was \$17.75 by December 22, according to the "Iron Age." This change in the price of scrap has forced a reversal in the economy of its use versus pig iron. Ordinarily scrap is cheaper than pig iron by 50 per cent, but at the turn of the year scrap was ruling at approximately Yen 80 per ton compared with pig iron at Yen 57, which naturally had its repercussion on steel prices and has stimulated the research and enterprise required for the production of synthetic scrap from low grade ores, to which reference has already been made.

Most of the shipments of scrap received in Japan consist of old engines, motor cars and rails from such ports as New York, Norfolk, Jacksonville, New Orleans and Galveston.

It is interesting to note that the attitude of the press in the United States towards Japan's large purchases of scrap has undergone a complete change since Western countries have become cognisant of the economic necessity of the use of scrap in maintaining steel production. This was pointed out by the writer in an article delivered to the American press in November 1935, which contained the following table, to which statistics for the years 1935 to 1936 have been added.

TABLE II.—PIG IRON MOVEMENT IN JAPAN PROPER  
(in metric tons)

Based on data in "Seitetsu Jigyo Sanko Shiryo" (Reference Book of Iron Industry), June 1936, compiled by the Mining Bureau, Department of Commerce and Industry, published by the Iron and Steel Institute, pp. 3, 19 and 83, except for 1936.

|      | Imports<br>Domestic<br>Production | Colonial<br>Imports | From<br>Manchuria | Other<br>Sources | Total     | Steel<br>Ingot<br>Production | Scrap and<br>Old Iron<br>Imports |
|------|-----------------------------------|---------------------|-------------------|------------------|-----------|------------------------------|----------------------------------|
| 1924 | 586,051                           | 73,513              | unknown           | 441,944          | 1,101,508 | 1,099,691                    | 42,080                           |
| 1925 | 685,178                           | 83,857              | 104,891           | 211,468          | 1,085,394 | 1,300,203                    | 43,784                           |
| 1926 | 809,624                           | 104,717             | 159,521           | 240,119          | 1,313,981 | 1,506,215                    | 80,171                           |
| 1927 | 896,171                           | 102,668             | 198,919           | 274,028          | 1,471,786 | 1,685,242                    | 224,137                          |
| 1928 | 1,092,536                         | 139,832             | 213,142           | 356,072          | 1,801,582 | 1,905,980                    | 363,652                          |
| 1929 | 1,087,128                         | 137,598             | 195,150           | 458,905          | 1,878,781 | 2,293,840                    | 487,947                          |
| 1930 | 1,161,894                         | 109,432             | 179,175           | 226,654          | 1,677,155 | 2,289,337                    | 488,922                          |
| 1931 | 917,342                           | 95,127              | 242,147           | 157,301          | 1,411,917 | 1,883,125                    | 295,600                          |
| 1932 | 1,010,761                         | 205,955             | 322,476           | 121,949          | 1,661,141 | 2,398,282                    | 559,079                          |
| 1933 | 1,423,889                         | 160,429             | 455,379           | 185,474          | 2,225,170 | 3,203,385                    | 1,012,964                        |
| 1934 | 1,728,158                         | 164,185             | 409,427           | 204,971          | 2,506,741 | 3,907,217                    | 1,412,988                        |
| 1935 | 1,906,787                         | 130,627             | 382,728           | 579,186          | 2,999,328 | 4,936,827                    | 1,692,148                        |
| 1936 | 2,045,000                         | 113,776             | 271,224           | 700,744          | 3,130,744 | 5,258,119                    | 1,497,043                        |

The rapid increase in the use of scrap iron in Japan has kept pace with the increase in the production of steel, as is clearly shown in the above table.

In addition to the imports, there is also consumption of home scrap consisting of foundry returns and other waste in the domestic iron and steel plants amounting to 800,000 tons and an additional supply of market scrap from all over the Empire of 750,000 metric tons.

Scrap iron consumption for 1936 is reported as 3,058,000 metric tons, of which the domestic production was estimated at 1,550,000 tons, and 1,508,000 tons imported. On the basis of this estimate it will be observed that the country supplied slightly more than 50 per cent of its scrap iron requirements.

The Mitsubishi Bureau gives the ratio of consumption of pig iron to scrap by the Japan Iron Co. in 1934 as 60 per cent pig to 40 per cent scrap, and other steel producers as 30 per cent pig and 70 per cent scrap. The same source places the percentage of the total scrap requirements imported in 1934 as 56, and of this 70 per cent came from the United States.

### Steel

A swift growth of demand, with which production could not keep pace, marked the progress of the steel industry during 1936. From a sluggish condition of threatened over-production the industry moved through a wide economic range to a condition of lack of supply which, in the final months of the year, assumed the proportions of a "famine." Contributory factors all combined to give the shortage its fullest effect, and the year closed with prices up by nearly 100 per cent, speculation at a feverish pitch, and with various industries closely allied to steel unable to obtain their requirements.

The market gave no indications during the first half of 1936 of the amazing up-swing that was to come. The year opened with prices only slightly higher than at the close of 1935, and amid a prevalent belief that a depressed condition threatened because expansion of the industry during the preceding 12 months had forged ahead of demand. After a Yen 10 to Yen 15 advance in March the market receded slightly and remained firm during the summer and early fall.

Mid-autumn brought the first hint of a major market rise, and in November, with fears of a steel shortage widespread, prices leaped to unthought-of levels and with a speed that suggested the feverish markets of the World War period. The condition of the market during the last two months is described most eloquently by actual quotations, those for round bars and plate, which were typical, being as follows:—

|                         | <i>Round Bars</i> | <i>Plate</i> |
|-------------------------|-------------------|--------------|
| January ..              | Yen 81.00         | Yen 99.00    |
| June ..                 | 93.00             | 106.00       |
| November 10 ..          | 98.00             | 120.00       |
| November 30 ..          | 105.00            | 135.00       |
| December 10 ..          | 130.00            | 165.00       |
| December 20 ..          | 140.00            | 195.00       |
| End December ..         | 150.00            | 210.00       |
| Increase during Year .. | 85.97%            | 112.1%       |

The upward sweep carried on into the new year, and by January 20 round bars were at Yen 220, or up 173 per cent, and plate was at Yen 260, an increase of 162 per cent.

So disturbing was the situation in early December that the Japan Iron Manufacturing Company was said to be on the point of entering into negotiations for the purchase of 20,000 tons of large shapes in Europe, for delivery up to the following spring. The company expected to pay from Yen 120 to Yen 150 per ton, including duty, which was about Yen 5 above the market prices then prevailing. When the four companies acting as Japan Iron's importing agents approached the European Steel Syndicate, however, the prices quoted, according to press reports, were about Yen 50 above those expected, and the idea was dropped.

The immediate cause of the boom market was the unbalanced condition of supply and demand, behind which were operating the factors that brought about a similar condition in pig iron. However, the market situation was severely aggravated by widespread speculative buying, especially in December, which was induced not only by the shortage itself, but also to a great extent by announcement of the projected increases in tariff which were intended to take effect with the beginning of the 1937 fiscal year. The rush to accumulate maximum stocks before the tariff rose was stopped to a considerable extent, however, by imposition of a license system for export exchange through an ordinance promulgated on January 8 of this year.

Foreign causes which operated to bring about the shortage in steel were, of course, those which helped produce a similar condition in the pig iron supply and have been previously mentioned. At home the chief factors were a steady increase in consumption, arising principally from industrial activity and from the demand created by the defence program, and the apparent failure of official policy to take early cognizance of growing consumption. The last-mentioned factors received a great deal of attention from the press, and the Ministry of Commerce and Industry came in for considerable criticism on the score that its policy had been based too much on furnishing protection for the Japan Iron Manufacturing Company. The critics were especially sharp-spoken when the Ministry issued a statement at the year-end which intimated that the condition was due largely to speculative buying.

The effects of the shortage were by no means confined to the market, but extended throughout the length and breadth of industry. Building construction was particularly hard hit, which was to be expected, as it was the second heaviest consumer of steel materials last year. A press survey in mid-December revealed that at least 60 important building projects in Tokyo alone had been seriously delayed. Ordinary iron frame was then being quoted at Yen 150 and reinforcing bars at Yen 145, but even at those prices they were many times unobtainable.

Shipbuilding was another industry that was badly affected. The year 1936 was an unexpectedly active one, during which Japanese yards received orders for 116 new craft aggregating more than 700,000 tons deadweight. At the year-end the yards had 142 vessels involving more than 800,000 tons either under construction or scheduled for construction early in 1937, but the

limited supply of iron and steel made it apparent that most of the orders could not be fulfilled within the periods stipulated.

Excitement of the boom market and the adverse effects of insufficient supplies obscured the fundamental fact that steel production in 1936, though far behind demand, underwent a substantial increase. The output of carbon steel ingots and castings for Japan and Korea was 4,914,067 metric tons, representing a gain of 510,363 tons over 1935, and that for Manchoukuo was 344,052, which was an increase of 207,234. The figures combined give a total production of 5,258,119 tons, which exceeded that of the previous year by a margin of 717,597 tons.

As shown in the accompanying table, the largest gain was in the category of rolled steel, production for Japan and Korea rising by 554,455 metric tons to 4,143,352, and that for Manchoukuo gaining 11,366 for a total of 136,112 tons.

The major portion of the country's output was by the Japan Iron Manufacturing Company, which announced its 1936 production as 1,776,861 tons of rolled steel, 322,516 tons of semi-finished material for rolling, and 2,669,538 tons of steel ingots. The bulk of Japan Iron's output was in turn accounted for by the Yawata Plant in Fukuoka Prefecture, which produced 1,450,020 tons of rolled steel, 261,648 tons of semi-finished products, and 2,121,936 tons of steel ingots.

#### PRODUCTION OF CARBON STEEL, 1936

(in metric tons)

|   | 1936      | Increase or Decrease compared with 1935. | Net Increase |
|---|-----------|--|--------------|
| Total of Carbon Steel Ingots and Castings : |           |  |              |
| Japan and Korea ..                          | 4,914,067 | 510,363                                  |              |
| Manchoukuo ..                               | 344,052   | 207,234                                  |              |
| Total .. .. ..                              | 5,258,119 | 717,597                                  |              |

The above is made up of the following kinds of steel :—

|                               | 1936      | Gross Increase or Decrease |
|-------------------------------|-----------|----------------------------|
| Cast Steel :                  |           |                            |
| Japan and Korea ..            | 109,788   | 10,293                     |
| Carbon Steel Market Billets : |           |                            |
| Japan and Korea ..            | 132,220   | 22,296                     |
| Manchoukuo ..                 | 74,612    | 47,814                     |
| Carbon Steel Sheet Bars :     |           |                            |
| Japan and Korea ..            | 357,427   | 131,986                    |
| Manchoukuo ..                 | 88,626    | 60,774                     |
| Tempered Steel :              |           |                            |
| Japan and Korea ..            | 72,125    | 8,960                      |
| Rolled Steel :                |           |                            |
| Japan and Korea ..            | 4,143,352 | 554,455                    |
| Manchoukuo ..                 | 136,112   | 111,366                    |
| Others :                      |           |                            |
| Japan and Korea ..            | 99,155    | *217,627                   |
| Manchoukuo ..                 | 44,702    | * 12,720                   |
| Total .. .. ..                | 5,258,119 | 947,944                    |
|                               |           | 230,347                    |

\* Indicates decrease.

The foregoing varieties of rolled steel were fabricated into the following shapes :

|                             | 1936      | Gross Increase or Decrease compared with 1935 |
|-----------------------------|-----------|---|
| Plate (under 7 mm. thick) : |           |   |
| Japan and Korea ..          | 439,771   | 81,044  |
| Manchoukuo ..               | 29,128    | 24,546  |
| Other Kinds of Plate :      |           |   |
| Japan and Korea ..          | 926,744   | 206,743                                       |
| Manchoukuo ..               | 509       | 388   |
| Tin Plate :                 |           |   |
| Japan and Korea ..          | 138,270   | 43,418  |
| Bars :                      |           |   |
| Japan and Korea ..          | 1,033,834 | 117,316                                       |
| Manchoukuo ..               | 64,794    | 54,512  |
| Shapes :                    |           |   |
| Japan and Korea ..          | 570,457   | 88,591  |
| Rails :                     |           |   |
| Japan and Korea ..          | 290,250   | 76,938  |
| Manchoukuo ..               | 39,160    | 29,735  |
| Wire :                      |           |   |
| Japan and Korea ..          | 437,892   | 29,852  |
| Tubes :                     |           |   |
| Japan and Korea ..          | 184,370   | * 2,683                                       |
| Strip Iron :                |           |   |
| Japan and Korea ..          | 73,363    | *17,454                                       |
| Others :                    |           |   |
| Japan and Korea ..          | 48,401    | *69,310                                       |
| Manchoukuo ..               | 2,521     | 2,185   |
| Total .. .. ..              | 4,279,464 | 755,268                                       |
|                             |           | 89,447  |

\* Indicates decrease.

The self-sufficiency in production which Japan is striving to obtain in its important industries was achieved to a surprising degree last year for the category of steel shapes in the steel industry. This fact is graphically brought out by the figures in the accompanying table:—

TABLE III.—PRODUCTION OF STEEL SHAPES

(in metric tons)

|                        | 1936 | Percentage of<br>Production | 1936<br>Self-Supply | 1936<br>Imports* | 1936<br>Consumption |
|------------------------|------|-----------------------------|---------------------|------------------|---------------------|
| Plates (under 7 mm.)   | ..   | 439,771                     | 99%                 | 4,000            | 443,771             |
| Miscellaneous Plates.. | ..   | 926,744                     | 97%                 | 28,000           | 954,744             |
| Tin Plate ..           | ..   | 138,270                     | 93%                 | 51,000           | 189,270             |
| Bars ..                | ..   | 1,033,834                   | 98%                 | 25,000           | 1,058,834           |
| Structural Shapes ..   | ..   | 570,457                     | 98%                 | 12,000           | 582,457             |
| Rails ..               | ..   | 290,250                     | 86%                 | 49,000           | 339,250             |
| Wire ..                | ..   | 437,892                     | 92%                 | 39,000           | 476,892             |
| Tube ..                | ..   | 184,370                     | 81%                 | 42,900           | 227,270             |
| Strip Iron ..          | ..   | 73,363                      | 68%                 | 34,000           | 107,363             |
| Unclassified ..        | ..   | 48,401                      | 99%                 | 1,000            | 49,401              |

\* Estimated.

Demand and supply figures on steel products for 1936, as estimated by the Ministry of Commerce and Industry, show an increase of 240,000 metric tons in demand, which is attributed to activity of the munitions industry, and an increase of 350,000 tons in the total supply. The difference between these two figures, or 110,000 tons, coincides with the increase in volume of steel products imported in 1936 as compared with 1935, and since the imports were heaviest in the latter part of the year, the figure throws interesting light on the market and consumer conditions then prevailing.

The Ministry's announcement showed that the total production of steel products reached 4,682,000 metric tons, of which domestic production accounted for 4,343,000, imports from Korea and Manchoukuo 44,000, and imports from abroad 295,000 tons. Exports were 950,000 tons, leaving an actual demand of 3,732,000 metric tons. Domestic production was 367,000 tons above that for 1935.

Machinery manufacture, metal works and building construction were the three chief fields of consumption. Details are given in the following table, based on a total consumption of 4,070,000 metric tons, which was prepared by the Toshi Keizai (Investment Economy):—

ESTIMATED CONSUMPTION OF STEEL MATERIALS IN 1936  
BY INDUSTRIES

(in metric tons)

|                 |    |    | Tonnage | Percentage |
|-----------------|----|----|---------|------------|
| Machinery ..    | .. | .. | 970,000 | 23.83%     |
| Building ..     | .. | .. | 950,000 | 23.30      |
| Metal Works ..  | .. | .. | 900,000 | 22.10      |
| Railways ..     | .. | .. | 270,000 | 6.63       |
| Shipbuilding .. | .. | .. | 160,000 | 3.93       |
| Mining ..       | .. | .. | 140,000 | 3.43       |
| Others ..       | .. | .. | 680,000 | 16.78      |

## Summary

As this article was going to press, the Research Department of the Japan Iron Manufacturing Company and the Department of Commerce and Industry released statistics from which the following summary of the iron and steel industry for 1936 has been compiled:—

## Pig Iron Production:

| Japan Iron Manufacturing Co.         |    | Metric<br>Tons | Metric<br>Tons |
|--------------------------------------|----|----------------|----------------|
| Yawata Works ..                      | .. | 1,331,000      |                |
| Wanishi ..                           | .. | 251,000        |                |
| Kamaishi ..                          | .. | 244,000        |                |
| Korea ..                             | .. | 211,000        |                |
|                                      |    | 2,037,000      |                |
| Other Domestic Works ..              | .. | 173,000        | 2,210,000      |
| Manchoukuo Production:               |    |                |                |
| Showa Steel Co. ..                   | .. | 490,000        |                |
| Honkeko Works ..                     | .. | 158,000        |                |
| Total ..                             | .. | 648,000        |                |
| Imported to Japan from Manchoukuo .. |    | 283,000        |                |

| Imports from Other Countries : | Metric<br>Tons | Metric<br>Tons |
|--------------------------------|----------------|----------------|
| British India ..               | ..             | 375,322        |
| America ..                     | ..             | 583            |
| Sweden ..                      | ..             | 51             |
| Germany ..                     | ..             | 21             |
| Others (mainly Russia) ..      | ..             | 322,504        |
|                                |                | *698,481       |

\*(Department of Commerce quantities. The Japan Iron Manufacturing Co. gives the imports as 701,000) .. 701,000

|   |    |           |
|---|----|-----------|
| Grand Total Pig Iron available ..                 | .. | 3,194,000 |
| Less Pig Iron required for cast iron foundries .. | .. | 729,000   |
|   |    | 2,465,000 |

| Scrap Iron :             |    |           |
|--------------------------|----|-----------|
| Imports :                |    |           |
| From America ..          | .. | 1,000,681 |
| British India ..         | .. | 139,483   |
| Dutch East Indies ..     | .. | 63,462    |
| Australia ..             | .. | 56,864    |
| Canada ..                | .. | 34,372    |
| Straits Settlements ..   | .. | 15,362    |
| Belgium and Luxemburg .. | .. | 7,666     |
| Others ..                | .. | 146,389   |
|                          |    | 1,464,279 |

|  |    |           |
|--|----|-----------|
| Note :   |    |           |
| The Japan Iron Manufacturing Co. give the total scrap iron imported as ..  | .. | 1,508,000 |
| To obtain the total iron available for steel making the domestic scrap should be added. According to statistics released by the Government Committee on Iron and Steel Industries this amounted to : |    |           |
| Home scrap from foundry returns, etc. ..   | .. | 800,000   |
| Scrap from the market ..   | .. | 750,000   |
|  |    | 1,550,000 |
| Total iron available for steel making ..   | .. | 5,523,000 |

| Steel Production :                                    |    |           |
|---|----|-----------|
| By Japan Iron Manufacturing Co. (Government works) .. | .. | 2,727,000 |
| Independent Domestic Plants ..                        | .. | 2,466,000 |
|   |    | 5,193,000 |
| Balance ..  | .. | *330,000  |

\* This is reported as 337,000 by the Japan Iron Manufacturing Co.'s Research Department. The difference is probably due to our failure to include amounts of less than 1,000 lbs. in the quantities given in this summary.

The Research Department of the Japan Iron Manufacturing Co. released other statistics, which are given here for checking, as follows:

Total supply of pig iron in 1931 was 1,468,000 tons; in 1936 it was 3,195,000 tons (more than double).

## PIG IRON (unit 1,000 tons)

|                             | 1931  | 1932  | 1933  | 1934  | 1935  | 1936  |
|-----------------------------|-------|-------|-------|-------|-------|-------|
| Produced ..                 | 1,065 | 1,173 | 1,598 | 1,939 | 2,118 | 2,211 |
| Imported from Manchoukuo .. | 245   | 329   | 462   | 418   | 391   | 283   |
| From Others ..              | 158   | 122   | 186   | 205   | 580   | 701   |
| Total ..                    | 1,468 | 1,624 | 2,246 | 2,562 | 3,089 | 3,195 |

The importation of scrap iron and steel in 1931 was 296,000 tons; in 1936 1,508,000 tons.

## SCRAP IRON AND STEEL IMPORTED

| 1931 | 1932 | 1933  | 1934  | 1935  | 1936  |
|------|------|-------|-------|-------|-------|
| 296  | 559  | 1,013 | 1,435 | 1,733 | 1,508 |

The steel supply was: In 1931, steel ingots 1,883,000 tons, and 5,189,000 tons in 1936.

Steel materials produced and imported in 1931 amounted to 1,930,000 tons, while in 1936 they amounted to 4,743,000 tons.

The details of steel ingots and steel castings were (unit 1,000 tons):

|             | 1931  | 1932  | 1933  | 1934  | 1935  | 1936  |
|-------------|-------|-------|-------|-------|-------|-------|
| Produced .. | 1,883 | 2,398 | 3,203 | 3,903 | 4,802 | 5,189 |

## STEEL PRODUCTS

|             | 1931  | 1932  | 1933  | 1934  | 1935  | 1936  |
|-------------|-------|-------|-------|-------|-------|-------|
|             | F. H. |
| Produced .. | 1,663 | 2,113 | 2,792 | 3,344 | 4,030 | 4,442 |
| Imported .. | 267   | 234   | 26    | 403   | 108   | 374   |
| Total ..    | 1,930 | 2,347 | 26    | 3,195 | 108   | 3,718 |
| Export ..   | 113   | 170   | 1     | 336   | 1     | 465   |

Remarks: F. = Finished. H. = Half finished.

## The Future Outlook

The prospects for iron and steel in 1937 are that both production and consumption will increase, but the former at a more rapid rate. The Ministry of Commerce and Industry, which is making every effort to accelerate production, has studied the country's needs and production possibilities, and the Minister, Vice-Admiral Takuo Godo, announced to the Budget Committee of the Diet in February the following program for the fiscal year beginning April 1:

|                        | Self Supply* | Imports | Total Production |
|------------------------|--------------|---------|------------------|
| (in 1,000 metric tons) |              |         |                  |
| Steel Products ..      | 4,650        | —       | 4,650            |
| Pig Iron ..            | 2,780        | 820     | 3,600            |
| Scrap Iron ..          | 1,550        | 1,600   | 3,150            |
| Ore ..                 | 1,300        | 3,500   | 4,800            |

\* Japan, Korea and Manchoukuo.

Almost at the same time the Japan Iron Works placed an order with the United Engineering and Foundry Co. of Pittsburgh, Pa., for a continuous hot strip mill which will produce annually about 450,000 tons of steel sheets, or an amount approximating the country's present total annual production. The firm also ordered a cold mill from the Mesta Machine Co. of New York, the combined cost amounting to about Yen 10,000,000. Both mills are for a steel plant to be erected at Tobata, near Moji.

The execution of the foregoing program, even if only approximate, should bring the supply and demand for 1937 into a balanced condition, and the iron and steel industry should enjoy another year of activity and expansion which, though less spectacular, will be more substantial than that of 1936.

On March 24 the Government Committee appointed to study the laws relating to the iron and steel industry reported in the press figures for the future demand and supply of iron and steel as follows:—

TABLE IV.—DEMAND FOR STEEL SHAPES

(in metric tons)

|  | 1936      | 1937      | 1941      |
|--|-----------|-----------|-----------|
| Prospective Demand for Steel Shapes .. | 4,700,000 | 5,000,000 | 6,200,000 |
| Including :                            |           |           |           |
| Demand in Japan Proper ..              | 4,150,000 | 4,650,000 | 5,850,000 |
| Export ..                              | 550,000   | 350,000   | 350,000   |

It is presumed that the total demand for steel shapes in 1941 in Japan proper, Manchoukuo and North China will amount to about 8,000,000 metric tons.

TABLE V.—SUPPLY OF STEEL SHAPES

The total supply to meet the above-mentioned demand is estimated as :

|                                       | 1936      | 1937      | 1941      |
|---------------------------------------|-----------|-----------|-----------|
| Total ..                              | 4,700,000 | 5,000,000 | 6,200,000 |
| The total includes :                  |           |           |           |
| Imports ..                            | 300,000   | 350,000   | 350,000   |
| Supply from Re-rolled Billets ..      | 200,000   | 200,000   | 200,000   |
| Manchurian Billets ..                 | 100,000   | 135,000   | 360,000   |
| Imported Billets ..                   | 80,000    | 180,000   | —         |
| Supply by Electric Furnaces ..        | 150,000   | 150,000   | 310,000   |
| Supply from Ordinary Iron Works ..    | 3,870,000 | 3,985,000 | 4,980,000 |
| Ingots necessary for the above ..     | 4,850,000 | 4,985,000 | 6,225,000 |
| Pig necessary for the above ..        | 2,480,000 | 2,650,000 | 4,740,000 |
| Scrap iron necessary for the above .. | 2,720,000 | 2,680,000 | 1,921,000 |

TABLE VI.—SUPPLY AND DEMAND OF PIG IRON

(in metric tons)

|                         | 1936      | 1937      | 1941      |
|-------------------------|-----------|-----------|-----------|
| Demand :                |           |           |           |
| For steel making ..     | 2,480,000 | 2,650,000 | 4,740,000 |
| For cast iron making .. | 750,000   | 950,000   | 1,150,000 |
| Total ..                | 3,230,000 | 3,600,000 | 5,890,000 |

## Supply :

|                         | 1936      | 1937      | 1941      |
|-------------------------|-----------|-----------|-----------|
| Nippon Seitetsu K.K. .. | 2,070,000 | 2,390,000 | 4,240,000 |
| Outsiders ..            | 190,000   | 390,000   | 920,000   |
| Manchoukuo ..           | 270,000   | 220,000   | 630,000   |
| Other Countries ..      | 700,000   | 600,000   | 100,000   |
| Total ..                | 3,230,000 | 3,600,000 | 5,890,000 |

TABLE VII.—SUPPLY AND DEMAND OF SCRAP IRON

|                         | 1936      | 1937      | 1941      |
|-------------------------|-----------|-----------|-----------|
| Demand :                |           |           |           |
| For steel making ..     | 2,720,000 | 2,680,000 | 1,921,000 |
| For wrought iron ..     | 250,000   | 250,000   | 250,000   |
| For electric furnace .. | 250,000   | 250,000   | 517,000   |
| Total ..                | 3,220,000 | 3,180,000 | 2,688,000 |

## Supply :

|  | 1936      | 1937      | 1941      |
|--|-----------|-----------|-----------|
| Recovery from scrap in Japan proper .. | 800,000   | 800,000   | 1,000,000 |
| From the market ..                     | 750,000   | 750,000   | 934,000   |
| Imported scrap ..                      | 1,670,000 | 1,630,000 | 754,000   |
| Total ..                               | 3,220,000 | 3,180,000 | 2,688,000 |

## Supply and Demand of Iron Ore, Pig Iron and Steel Shapes of Japan in 1936

According to the data published by the Department of Commerce and Industry, the approximate amount of the supply and demand of iron ore, pig iron and steel shapes in 1936 was as follows (in metric tons):—

|                           | Iron Ore  | Pig Iron  | Steel Shapes |
|---------------------------|-----------|-----------|--------------|
| Production (A) ..         | 1,227,000 | 2,261,000 | 4,400,000    |
| Import (B) ..             | 3,828,000 | 972,000   | 300,000      |
| Total Supply (A+B) ..     | 5,055,000 | 3,233,000 | 4,700,000    |
| Export (C) ..             | —         | —         | 550,000      |
| Demand (A+B+C) ..         | 5,055,000 | 3,233,000 | 4,150,000    |
| A                         |           |           |              |
| Self Supply Percentage .. | 24%       | 70%       | 106%         |
| A+B-C.                    |           |           |              |

## Electrifying Manchoukuo

Moving to bring electricity into Manchoukuo homes and farms, the Manchuria Electrical Industry Company is now carrying out its five-year program providing for the building of 15 new power plants and a nation-wide grid for distribution at a total cost of Y.85,006,000. The project will also include the Kwantung Leased Territory and the South Manchuria Railway Zone.

According to the present scheme, it is assumed that in five years Manchoukuo will require sufficient electrical current to light 2,625,000 lamps and have a power demand of 893,547,000 kilowatts. Work on nine of the projected fifteen new power plants was started in 1935, and these new plants may be located in Hsinking, Harbin, Tsitsihar, Taonan, Jehol, Heilungkiang, Hailar, Chengte and Chih-fengkow. In the current year, three more will be built at Hsinking, Tsitsihar and Antung until 1938, when the new plants in Dairen and Hsian will be put into operation, but the central power unit in Western Manchoukuo will come into being in 1939, with substations at Port Arthur, Mukden, Anshan, Hsinking, Hsian, Harbin, Dairen and Yingkow. A network of transmission lines will be established between Anshan and Pingkow, a distance of 90 kilometers; between Hsian and Hsinking, 170 kilometers; and between Hsinking and Harbin, 260 kilometers. The western central power plant will be linked to Yingkow, 175 kilometers away and Yingkow, in turn, will connect with Dairen, a distance of 230 kilometers. It is estimated that the total outlay of capital needed to complete the project will be Y.85,006,000. With regard to the prospective demand for light and power in Manchoukuo, the Kwantung Leased Territory and the South Manchuria Railway Zone which the Manchuria Electrical Industry Company will undertake to supply, it is estimated technically that there will be 2,625,000 lamps and 893,547,000 kilowatts for power by the end of 1939.

# The Depression Passes

## Strong Flowing Tide of Returning World-Wide Prosperity is Surveyed in Statement of Leading Japanese Financier

**A**N all-around betterment of foreign trade of the leading Powers is disclosed, and clear evidence that the great depression at length is being lifted from world markets by a strong-running tide of returning world-wide prosperity, is presented in lucid terms in a statement made recently by Mr. Toshikata Okubo, President of the Yokohama Specie Bank, Ltd., of Japan. This forms the subject-matter of the address that was delivered on March 10 by Mr. Okubo at the ordinary general meeting of the shareholders of the Yokohama Specie Bank at the Head Office in Yokohama. In this address world-wide business conditions through the second half of the year 1936 are reviewed in detail. Pertinent portions of the address are given as follows:—

Economic conditions in Japan showed further progress towards recovery, and a fundamental improvement was evident in financial and industrial quarters.

In conformity with the national defence programme and other emergency measures, there has been a tendency towards Government control over divergent sections of industry, and various measures to effect this were announced in succession. Many of these, however, remain undecided as yet, legislation being required before putting them into practice, while others have been subjected to minute discussion as to their feasibility.

Under such circumstances, and owing also to the publication of the tax reform plan, caution and hesitancy seem to characterize the financial situation. In the matter of foreign trade the restrictions in other countries remain unrelaxed. The Indo-Japanese negotiations have shown little progress, while the trade with Australia was almost at a standstill until December, when a new agreement was concluded.

Considerable difficulties have also been encountered in developing new markets abroad, and the expansion of the export trade has, for this reason, been somewhat checked. Owing, however, to the world-wide economic recovery, and to the resultant rapid improvement in commodity prices in general, Japanese foreign trade continued prosperous, and such being the case, this also tended to exert a favourable influence over the home industries.

High prices in rice, cocoons, and other agricultural products have increased the purchasing capacity of the farming communities, and general business prospered. Towards the close of the term heavy imports of raw material were made in anticipation of a considerable increase in demand and in fear of a higher import tariff. Prices of commodities manufactured from the imported raw materials rose sharply, and the industries affected showed a marked activity.

### Prices on Upgrade

When we examine statistics as an indication of prevailing conditions we find that the index figure of production in the manufacturing and mining industries (1931-33=100), which stood at an average of 144.5 in the second half of the previous year, rose sharply to 157.4 in the period under review, while the price of rice, taking the half-yearly average, improved from Y.30.39 to Y.30.85 per koku when compared on a similar basis. The half-yearly average of summer and autumn cocoon prices showed a slight decline, but still remained on a high level. The raw silk market was favourably affected by the improvement in business conditions in the United States, the price rising above the level of Y.900 in the month of November.

Prices of iron, copper, and other metals displayed a sharp rise, and those of foodstuffs, clothing, etc. likewise advanced. As a result, the index to wholesale commodity prices for the term stood at 161.3, a remarkable improvement in comparison with 149.9 for the corresponding term of the previous year and with 152.6 for the preceding period. Goods stored in warehouses at the close of the term totalled 539 million yen in value, or 1 million yen more than for the year previous, while freight loadings on the Government railways aggregated 39 million metric tons, an increase of 9 per cent over the corresponding period of the preceding year.

On the money market the new issue of Government Bonds, Rice Purchase Notes, and Treasury Bills amounted respectively to 1,884 million yen, 797 million yen, and 80 million yen, against which redemptions to the extent of 1,357 million yen, 833 million yen and 80 million yen were respectively carried out, with the result that the outstanding balance of the internal public debt at the end of the term stood at 9,488 million yen.

The note issue of the Bank of Japan amounted to 1,865 million yen at the end of the term, showing an expansion of 99 million yen, as compared with twelve months previous. The gold reserve of the Bank increased by 24 million yen during the term to 548 million yen. Deposits in the ordinary banks showed a rapid increase of 677 million yen to a total of 10,932 million yen, while advances amounted to 6,660 million yen, an increase of 415 million yen. The security holdings of the banks increased also by 238 million yen, recording a total of 4,795 million yen.

Post Office savings and money held by trust companies showed also increases respectively of 91 million yen and 26 million yen, registering 3,352 million yen and 1,841 million yen at the end of the term. New capital issues of banks and companies totalled 1,133 million yen, showing an increase of 81 per cent over the corresponding period of the previous year, and of 30 per cent over the preceding term. Bank clearings aggregated 36,940 million yen, an increase of 9 per cent when compared on the usual basis. In the security market Government Bonds were firm at the beginning of the term, but, later on, slowed down slightly, while debentures moved *pari passu*. In sequel to the strong tone shown in the previous term share prices displayed a monthly advance, the index figure (January 1924=100), which stood at 117.7 at the beginning of the term, rising to 121.2 at the end.

Reviewing foreign trade, exports and imports amounted respectively to 1,475 million yen and 1,274 million yen, showing increases of 149 million yen and 146 million yen as compared with the corresponding term of the previous year, with the result that the excess of exports over imports recorded 201 million yen, or an increase of 3 million yen.

Dealing with the principal commodities and comparing the figures respectively with those for the corresponding half of the previous year: among exports raw silk registered a gain in value of 15 million yen, due to an increase in quantity of 16,000 bales and also to a rise in price. Cotton tissues recovered slightly, showing respective increases in quantity of 39.6 million square yards and of 15 million yen in value, while rayon piece goods increased also by 14 million yen. Silk piece goods, however, fell off by 2 million yen.

Under the heading of imports, the quantitative increase in cotton of 1.7 million piculs was, to a large extent, a reflex of the unusually small imports caused by the restriction of purchases in the previous term, and as the price rose also, a rapid increase in value of 109 million yen was recorded. The gains in iron of 34 million yen and in mineral oils of 7 million yen were accounted for by active demands in special industries. As regards wool, imports of which from Australia were restricted due to the application of the Law for the Safeguarding of Commerce, this suffered a considerable decline of 220,000 bales in quantity and of 62 million yen in value.

### Japan's Foreign Trade

Reviewing foreign trade next according to countries, we find that exports to and from the United States showed an increase of 44 million yen in either case, while exports to China improved by 28 million yen, against which imports registered an increase of merely 5 million yen. Trade with Manchuria, inclusive of Kwantung Province, recorded a gain in exports of 43 million yen, but imports showed a merely nominal increase of 3 million yen. Regarding the trade with British India, exports fell off by 9 million yen, against which imports rose sharply by 45 million yen, due mainly to Japanese increased purchases of raw cotton. Exports to the South Sea countries gained by 4 million yen, while imports registered a

rapid increase of 39 million yen, for which active shipments of iron ores, mineral oils, rubber, and other raw materials were responsible.

With regard to Europe, taking Great Britain, Germany, and France as a whole, exports improved by 21 million yen, but imports declined by 8 million yen. As to the trade with Africa, owing partly to the exploitation of new markets and partly to Japanese increased purchases of wool and cotton, respective gains of 13 million yen and 29 million yen were recorded. In the case of Central America, both exports and imports showed increases of 7 million yen, the reciprocal trade agreements becoming operative; trade with South America increased by 3 million yen in exports, while imports showed a rapid gain of 53 million yen, this being a result of the diversification in the source of Japan's purchases of wool and raw cotton.

Owing to the trade disagreement, exports to Australia fell off by 8 million yen, while imports suffered a serious decline of 103 million yen. Thus, taking the whole year, Japan's total exports and imports aggregated respectively 2,693 million yen and 2,764 million yen, showing in either case an increase of 7.8 per cent and 11.8 per cent, and when we add the returns of Chosen and Taiwan to the above figures we find that the exports and imports for the whole year stood at 2,978 million yen and 2,928 million yen, a total of 5,726 million yen being newly recorded. As a result, an excess of imports over exports to the amount of 130 million yen was shown for the year.

### Conditions in the U.S.

In the United States, as is usual in the year of a Presidential Election, the general attitude was inclined to be one of watchfulness as to how affairs would develop. The re-election, however, of Mr. Roosevelt in November by an overwhelming majority cleared the political horizon, giving rise to expectations of financial improvement and producing a very favourable outlook for business. At the beginning of the term there occurred a very serious drought affecting thirteen States in the eastern and central parts of the country, with the resulting reduction in the scale of the crops; but the rise in the market price tended, to a large extent, to more than compensate the farmers for the loss they otherwise would have sustained. This latter factor, coupled with the money realized in payment of the veterans' bonus, brought about an increase in the purchasing capacity of the whole country and greatly facilitated the improvement in business.

The actual result of the Treasury finance for the term was that there was a decrease in revenue of 486 million dollars, when compared with the corresponding period of the previous year, showing a deficit of 1,394 million dollars. Of this deficit, approximately 770 million dollars was made good out of the General Fund Account and the balance was covered by the public loans, with the result that the outstanding balance of the national debt at the end of the term stood at 34,406 million dollars.

Industry continued on the upward grade since the previous term, and the production index of the Board of Governors of the Federal Reserve System showed the highest record since 1930. Agriculture suffered severe damage from the drought. To quote an instance of this, maize was reported to be the smallest crop on record since 1881, while wheat could barely meet the demand for domestic consumption. Cotton was less affected, the crop in the southern parts of the country being normal, and the price at the end of the term stood at 12.99 cents, showing a merely nominal advance of 8 per cent as compared with the close of the previous year. Mining registered an increase of 13 per cent when compared with the previous year.

The operation of steel mills was recorded as 77 per cent at the end of the year, and automobiles showed a prosperity only second to that of 1928 and 1929. Car loadings and electricity consumption increased in volume, while the aggregate of building contracts was 57 per cent in advance of the preceding year, the increase in the number of dwelling-houses being especially pronounced. The prosperity in the spinning industry was even more remarkable; demands for cotton yarn and tissues, as well as artificial silk, were so active that transactions were made on the basis of future delivery. The index figure of wholesale commodity prices (pre-war basis), which improved from 116.5 at the beginning of the term to 117.4 in the middle, recorded a further rapid advance to 127.9.

### Unemployment, Labor and Capital

The unemployment problem remained unsolved, the number of the unemployed amounting still to 8,960,000. The dispute

between capital and labor, and the internal friction among trade unions, existing from the previous term, became further aggravated during the period under review, resulting in the outbreak of the longshoremen's strike on the Pacific Coast and the trouble in the General Motors Corporation. These have been watched with the keenest interest, inasmuch as they exercise a very important influence upon industry in general.

Reviewing foreign trade, American exports and imports for the period totalled 1,297 million dollars and 1,255 million dollars respectively, with the result that a favourable balance to the extent of 42 million dollars was shown. When compared with the corresponding term of the previous year, exports increased by 3 per cent and imports by 18 per cent. The comparative inactivity of exports was accounted for by the reduced crops caused by the drought, as well as by the protective tariff enforced in various countries, while the remarkable increase in imports appears to be due mainly to the increased demand for raw materials in consequence of the industrial activity.

The favourable balance for the year was the smallest on record since 1895. Towards the end of the year fifteen reciprocity treaties were concluded under the Reciprocal Trade Agreement Act, those with Canada and with France, *inter alia*, being regarded as of particular importance. The net imports of gold and silver for the term amounted to 606 million dollars and 64 million dollars respectively, showing in either case a considerable decrease, as compared with 936 million dollars and 262 million dollars for the corresponding term of the previous year.

Reviewing monetary conditions, funds on the market were always ample, as a result of the distribution of Government relief money, allowances for retired soldiers, and payments of a very considerable amount of extra dividends made by various corporations. The rapid growth, however, in the volume of excess reserves of member banks as a consequence of the constant inflow of gold from abroad created a danger of credit expansion. Accordingly, the Board of Governors of the Federal Reserve System carried into effect on August 15 its decision to exact a 50 per cent increase in the reserve requirements of member banks, thus removing approximately 1,400 million dollars from the existing excess reserves amounting to 3,200 million dollars. In addition, a revision was made in the gold purchase system on December 21, by which the Government, instead of giving gold certificates to the Federal Reserve Bank in exchange for gold bullion, undertook to withdraw idle money from the market by the sale of Treasury Bills, and to use the proceeds for the purchase of gold. The gold purchased being thus transferred to the "inactive fund," the danger of a possible credit expansion was eliminated. Money in circulation at the year-end amounted to 6,550 million dollars, an increase of 628 million dollars as compared with the previous year, the highest record since the financial crisis of March 1933.

Demand deposits, fixed deposits, and Government deposits held by all the member banks in the country totalled respectively 15,571 million dollars, 5,067 million dollars and 702 million dollars; of the inter-bank deposits, 6,009 million dollars was for domestic banks' account, and 427 million dollars for foreign banks' account. Loans and investments of the member banks registered 22,931 million dollars.

As regards the new capital market, the total flotations during the term reached 2,616 million dollars, of which new issues amounted to 1,116 million dollars, or an increase of 27 per cent as compared with the corresponding term of the preceding year. Such an increase is said to be due to the heavy demand for funds for the construction and reconstruction of plants.

Reviewing foreign exchange, the gold influx from Europe still continued, and according to the announcement made by the Treasury at the end of November the net amount of foreign capital which flowed into the country during the past 21 months totalled 2,281 million dollars. The Tripartite Monetary Agreement and the Gold Exchange Agreement concluded between England, America, and France with reference to the devaluation of the French franc attracted attention both at home and abroad as being a new step in the direction of international stabilization of currencies. The exchange on London, which stood at \$5.02 at the beginning of the term, advanced to \$5.06 $\frac{1}{2}$  in September, the highest on record since August 1934, but later it declined gradually until \$4.91 was quoted at the close of the term. The quotation on Paris fell to 6.58 $\frac{1}{2}$  cents in August, and, after showing a heavy slump at 5.15 cents at the end of September, closed the term in the vicinity of 4.67 cents.

## On the Pacific Coast

In the district of Seattle the longshoremen's strike, which broke out at the end of October, caused a deadlock in the trade along the coast for a time, but did not affect the basis of the economic world. In the lumber industry, in spite of active demands, the output declined and stocks showed a gradual decrease. In the vicinity of San Francisco both exports and imports were affected by the strike from November and the volume fell off by half, while farmers were favoured by the rise in prices of their produce.

In the district of Los Angeles improvement in the financial position of the farming community as well as prosperity in special industries, such as film production, gave great encouragement to business circles. In Hawaii the two principal industries, viz. sugar-refining and pine-apple growing, continued favourable, but coffee-planting and fisheries were less prosperous. The shipping industry and the import trade were much affected by the strike. The year, however, closed in anticipation of an early settlement.

Turning next to Brazil, agriculture was, as a whole, favourable. The crop of coffee for the current year was estimated to be one million bags less than for the year previous, but the Government control on production continued to be in force, and the destruction of surplus stocks from July to November aggregated 2.58 million bags. Since the opening in Bogota of the Central and South American Conference of the coffee-producing countries in October, the market strengthened sharply, recording the highest price obtained in recent years. Regarding trade with Japan, Japanese purchases of cotton were so active that they totalled 255 thousand bales for the eleven months from January to November. The visit of the Brazilian Economic Mission last autumn contributed to strengthen the connection between the two countries, and imports of Japanese goods now show a tendency to increase, and there is some indication of a favourable issue to the immigration question.

## Conditions in England

Turning to a review of the economic condition of Europe, and of England first. In her position as the most important member of the Non-Intervention Committee, England was largely instrumental in localizing the struggle in Spain, thereby decreasing the political tension prevailing all over the Continent. By speeding up her rearmament scheme, she now aims at safeguarding the peace of Europe. In the economic world the cheap money policy and the protective tariff policy have now borne fruit, and this, in conjunction with the rearmament scheme, has given a stimulus to home industry in general, with a corresponding rise in commodity and share prices. The actual result of the Treasury finance covering the half-year from July to December was that revenue and expenditure amounted respectively to 443 million pounds and 582 million pounds, showing, as compared with the corresponding term of the previous year, an increase in the former of 7 million pounds, against which the latter increased rapidly by 32 million pounds, due mainly to the augmentation in the defence expenditure.

Reviewing industry, the building industry seems to have already passed its zenith. Steel, engineering and electricity were very active, and shipbuilding seems to be on a fair way towards recovery. Cotton spinning has not yet fully recovered, and efforts towards recovery are now being made by the Lancashire Cotton Corporation by reduction of capital. Coal-mining was favourably affected by the conclusion of the Anglo-Italian Trade Agreement, while the reduction in France in the import duty, as well as the increase in the import quota, cast a gleam of light over the future of the mining industry. The recovery in shipping is remarkable, the tonnage of tied-up vessels having been reduced since April by 20 per cent. So great an improvement is chiefly due to the rationalization measures adopted by the tramp shipping firms, including the institution of the minimum freight scheme, and also to the tramp shipping subsidy.

The activity in industry in general stimulated the demand for labor, and the number of unemployed in December was returned as 1.62 million, a decrease of 0.23 million when compared with twelve months previous. The wholesale commodity prices showed a remarkable rise during the term, the index figure, which stood at 108.3 in July, increasing to 119.7, while the cost of living rose from 146 in July to 151 in December, taking 1914 as a basis.

Reviewing foreign trade, exports and imports amounted respectively to 261 million pounds and 445 million pounds, each

showing an increase of 14 million pounds and 44 million pounds as compared with the corresponding term of the previous year. The increase in imports was mainly accounted for by the activity of the home industries, as well as by the rise in the national purchasing power, as evidenced by the activity in raw cotton, lumber, cereals, etc. During the period the Government endeavoured to stimulate the export trade, as shown by the conclusion of the Anglo-Italian Trade Agreement, and the granting of credits to Soviet Russia by the Export Credits Guarantee Department. It is also reported that a scheme for granting credits to China is now under consideration.

## Conditions in Europe

In France the Leon Blum Ministry carried through the reform of the Bank of France, the Government control over which became stricter. With the view of strengthening the national defence, the Armament Industry Nationalization Law was promulgated, while for the purpose of affording relief to the unemployed the Public Works Law was enacted. Owing to the heavy additional financial burden entailed, however, the Government failed to secure the confidence of the nation in the Treasury finance and in the franc. The result of the issue of the "Baby Bonds" was not so satisfactory, and with the continued decline in the foreign exchange a heavy drain of gold specie took place. As a result, the gold reserve of the Bank of France, which stood at 54,300 million francs, or in the ratio of 57.87 per cent at the beginning of the term, fell rapidly to 50,100 million francs, or 54.42 per cent by September 24. On the 26th of the same month the Government finally suspended the gold standard and decided upon the devaluation of the currency.

As soon as the franc was devaluated Switzerland followed suit, and Greece linked its currency to sterling. Lithuania also suspended the gold standard, and Czechoslovakia and Italy carried through a second devaluation. Thus the Gold Bloc came to an end.

Regarding foreign trade, imports and exports for the term amounted respectively to 13,440 million francs and 8,280 million francs, each showing an increase of 3,100 million francs and 760 million francs, compared on the usual basis. The result was that an excess of imports over exports to the extent of 9,940 million francs was recorded for the whole year, showing a rapid increase of 4,470 million francs as compared with the previous year. The factors contributory to this were the comparatively high exchange of the franc in terms of foreign currency and speculative imports prior to the devaluation, on the one hand, and the rise in the price of imports after the devaluation on the other. Foreign exchange suffered wide fluctuations, being affected by the political conditions at home and abroad.

Coming to Germany, where the "Four-year Plan" previously initiated with the object of reducing unemployment proved highly successful, a second "Four-year Plan" was announced in the earlier part of September, embodying the exploitation of the national resources in order to render the country self-sufficing in the matter of raw materials, in consequence of which the agitation for securing colonies became nation-wide. To counteract a possible rise in commodity prices, as a sequel to the new Plan, a Decree prohibiting any such increase was issued.

Industry in Germany continued active. The index of industrial production, taking the prosperous year of 1928 as a basis, stood at 113.7 in November, or an increase of 4 per cent over the figure at the end of the previous term and of 17 per cent over that of twelve months previous. The number of workers employed in industry in October stood at 6½ million, or double the number when compared with January 1933.

Owing to the extension of the term of military service, the number of unemployed decreased to approximately one million in September, the lowest on record since 1928; and although it increased again to 1.47 million in December, it is still less by over one million when compared with the corresponding month of the previous year. Owing to the shortage of raw materials and provisions, commodity prices tended to rise, but this was checked by the decree against profiteering. Thus the price index of wholesale commodities in December stood at 105 (1913=100), showing merely a slight increase of 1 per cent as compared with the figures six months previous.

Foreign trade also continued favourable. Exports and imports amounted respectively to 2,520 million marks and 2,109 million marks, showing an increase in the former of 300 million marks, and a slight decrease in the latter, with the result that a favourable

balance to the extent of 400 million marks was recorded. Taking the year of 1936 as a whole, exports and imports totalled 4,770 million marks and 4,220 million marks, or an excess in the former of 550 million marks over the latter.

### In the Near East

Taking a look at Egypt, the Anglo-Egyptian Treaty negotiations were re-opened by the new Ministry, and an agreement on long-pending questions, such as that of the Sudan, the military status, the abolition of extraterritoriality, etc., having been reached, the Anglo-Egyptian Treaty was formally signed in London at the end of August, and ratified in December.

The Government has been on a solid foundation, the Treasury finance being so satisfactory that the accumulations of the annual surplus have reached over 33 million pounds. In the current fiscal year, however, the conclusion of the Anglo-Egyptian Treaty has necessitated various new undertakings, and as the revenue from the Customs duties has been tending to decrease owing to inactivity in trade, the Government is now considering the question of levying a tax on the business turn-over and on special licences.

Dealing with the principal commodities, cotton was estimated to show a record crop for the past ten years, and notwithstanding that exports at the beginning of the term were adversely affected by the political unrest in Europe, the market price was maintained due to the financial support of the Government and also to the high price of American cotton. Towards the end of the term exports of that commodity became very active. The crops of other agricultural produce were also plentiful, but exports being inactive, prices declined. Wheat was the most seriously affected, the price falling sharply, and a crisis was only avoided through Government intervention. Owing to high prices abroad, however, the prices of imported goods rose. In the foreign trade, exports were inactive and continued dull since the beginning of the term, but took a favourable turn from November, due to the heavy shipments of cotton. Exports and imports for the six months from July to December amounted respectively to 17.97 million pounds and 16½ million pounds, the latter showing a decrease of approximately 10 per cent, as compared with the corresponding term of the previous year.

Regarding the trade relations with Japan, the negotiations consequent upon the denunciation in July 1935 of the commercial treaty have made little progress. The shipments of cotton to Japan increased by approximately 30 per cent, but imports from Japan went off by 40 per cent. Trade with Syria and Palestine has not shown much improvement as yet, but the establishment of a free-trade zone in the port of Alexandria towards the close of the term is expected to produce a good result in the transit trade.

The security market was active at the beginning of the term, but slumped heavily in the middle in anticipation of the abolition of extraterritoriality. The condition of the market was critical for a while, and although somewhat restored by an announcement on the part of the Finance Minister that the question of foreign capital would be favourably considered after the abolition of extraterritoriality, uneasiness still prevails, due to uncertainty as to the rate of the new taxes now under contemplation. Money was easy at the beginning of the term, but gradually became tight when the cotton came on the market. From the middle of the term, owing to the question of extraterritoriality, capital began to leave the country, and when, on the occasion of Premier Nahas Pasha's return from England, a devaluation of the Egyptian pound was rumored, the exchange on London rose sharply. On the Finance Minister's announcement to the contrary, however, the situation was restored, and with the active shipments of cotton the money market became brisk, while exchange on London went slightly above the £97½ level.

### Conditions in Australia

In Australia the political situation has been generally quiet in recent years, the Treasury finance showing a remarkable improvement. Economic conditions have been on a fair way towards recovery, as evidenced by the activity of the principal products, by the increase in trade and in business transactions, and by a decrease in unemployment.

The actual result of the Commonwealth Treasury finance for the last fiscal year ending June showed a net surplus of 3.6 million pounds, which was appropriated for invalid, old-age, and war pen-

sions, while the Budget for the current fiscal year provided for remissions in the sales tax, income tax and prime duty, totalling roughly 5.2 million pounds. In the State Government's finance, a gradual improvement is also apparent, the Budgetary deficit being reduced to 1.2 million pounds for the current fiscal year.

Regarding the trade disagreement between Japan and Australia a provisional agreement was reached towards the end of December. Under the Agreement, which took effect as from January 1 this year, the Commonwealth Government undertook to repeal the statutory rule of a licensing system on Japan's imports issued on July 8, 1936, and to accord to Japan the benefits of the intermediate tariff rates on cotton and rayon piece goods; while the Japanese Government agreed to abolish the licensing system adopted in June, 1936, and to permit the importation into Japan from Australia during the one and a half-year period ending June 30, 1938, of not less than 800,000 bales of wool, and during the same period to limit the quantity of exports into Australia from Japan of cotton and rayon piece goods to the amount of 76,875,000 square yards in each case.

During the term the Government concluded new commercial treaties with Belgium, Czechoslovakia, and South Africa.

Foreign trade was active, and exports and imports for the five months ending November amounted respectively to 39.8 million pounds and 38.6 million pounds, each showing an increase of 2.9 million pounds and 3.7 million pounds, expressed in English currency. The increase in exports was chiefly due to activity in wool, while that in imports was largely accounted for by an increase in machinery, metals, metal manufactures, etc. As a result, exports exceeded imports by 1.2 million English pounds, and when the net exports of bullion and specie were included, the excess of exports reached 4.8 million English pounds.

### Business in the Orient

Coming to the East, and dealing with British India first, an announcement was issued by the Government in the middle of October that the preferential duties stipulated in the Ottawa Agreement would be continued pending the conclusion of the new trade agreement now under negotiation between England and India. Regarding the second Indo-Japanese Trade Conference, negotiations are now proceeding in Delhi. The British Government, at the end of October, notified the Japanese Government of its denunciation of the Indo-Japanese Trade Agreement of 1934 as from the expiry date of March 31 of this year.

Dealing with the principal commodities, the cotton crop in the United States for this year was predicted to be good, and the estimate of the acreage under plantation in India showing also an increase of 3 per cent over last year, cotton spinners at home and abroad delayed placing their orders, due to which prices weakened. Owing, however, to the favourable turn in the American cotton market in September, the price made a slight recovery, and after the middle of December heavy purchases were made by Japan.

Reviewing foreign trade, exports amounted to 958½ million rupees, showing a noteworthy increase of 167 million rupees over the corresponding half of the previous year, due to active shipments of raw cotton, oil seed, jute, jute manufactures, tea, and other principal products. Against these, imports fell off by 65 million rupees, and amounted to a total of 601.3 million rupees, the increase in machinery and rayon piece goods being more than offset by a considerable increase in raw cotton, cotton manufactures, oils, dyestuffs, etc. As a result, the excess of exports over imports stood at 232 million rupees higher than for the corresponding term of the previous year, the excess reaching 357 million rupees by the end of the period.

In Burma the separation from India was to take effect from April this year. The general election of the representatives to be sent to the Lower House after the separation was held in November, with the result that the collaborationists obtained the majority by a small margin. With regard to the trade negotiations between Japan and Burma, conferences have been held several times since December, and the negotiations are proceeding smoothly.

Dealing with the principal commodities, although the farming communities have not fully recovered from the protracted depression as yet, the crop of rice was normal, and the price was maintained fairly high, being favourably affected by the report of poor crops abroad, while 3 to 3½ million tons seem to be available for export. The actual yield of cotton was smaller than was expected, and vigorous Japanese purchases taking place, the stocks fell short.

Rubber, lead, and other products rose in price, due to which an improvement is expected in the purchasing power of the ryots.

Exports and imports for the five months from July to November amounted to 91.6 million rupees and 53 million rupees, showing a decrease in the former of 3.6 million rupees and an increase in the latter of 0.65 million rupees, as compared with the corresponding period of the previous year. Exports to India improved by 0.7 million rupees to 171.4 million rupees, and imports also rose by 6 million rupees to 51.2 million rupees.

In Malaya the principal commodity markets improved simultaneously from the beginning of the term, rubber and tin being most active, due to the world-wide demand. The price of rubber, in spite of the International Rubber Regulation Committee's pronouncement in the middle of December fixing the output quota at 75 per cent for the first quarter of 1937 and 80 per cent for the second quarter, rose rapidly from 26½ cents at the beginning of the term to 39½ cents, the highest, at the end. As a result, although the quantity exported during the five months ending November showed a decrease of 9,000 tons, when compared with the corresponding months of the previous year, the total export realized 140 million dollars, a sharp increase of 33 million dollars.

With regard to tin, notwithstanding the fact that the International Tin Committee decided to increase the output quota for the first quarter of 1937 to 100 per cent, the price moved up from \$87½ at the beginning of the term to over \$115 at the end, while the exports for the five months amounted to 35,000 tons, or 58 million dollars, showing an increase of 8,000 tons, or 6 million dollars over the same period of the previous year.

Regarding imports, the question arose in the Straits Settlements Legislative Council on August 24 as to whether a special committee should be appointed to examine the question of Japanese competition, but it was announced by the Government that the appointment of such a committee was at present unnecessary. In the middle of November the Government decided upon a tender system for the import quotas of cotton and rayon piece goods from the year 1937, and also upon the establishment of a quota system for the imports of whole and semi-manufactures of cotton and rayon textiles: in accordance, however, with the British Government's instructions, these decisions were not placed on the minutes of the Legislative Council, and it was officially announced that the present system would be continued for the first half of 1937. In conformity with the industrial prosperity, the price of copra, sago flour, and other native products improved. Wages also rose, and the Federal Government decided upon an increase of 5,000 in the number of coolies during the current year.

Exports and imports for the six months ending December amounted respectively to 343 million dollars and 272 million dollars, showing an increase of 55 million dollars and 42 million dollars in each case as compared with the corresponding term of the previous year, with the result that the excess of exports over imports reached 72 million dollars.

In Siam, where a branch of the Yokohama Specie Bank was established in July, the Government was firmly installed, and various administrative and economic measures were carried through systematically. In spite of a considerable increase annually in the national expenditure, the Budget for the fiscal year commencing April last year estimated revenue and expenditure respectively at 101.04 million ticals and 100.98 million ticals, leaving a surplus of 0.06 million ticals.

Exports and imports for five months from July to November amounted respectively to 51.74 million ticals and 38.8 million ticals, showing an increase in the former of 4.6 million ticals and a decrease in the latter of 0.6 million ticals, as compared with the corresponding months of the previous year, with the result that an excess of exports over imports reached 12.94 million ticals. The principal exports were rice, rubber, teak, tin, gold in specie and bullion, while the main imports were textiles, provisions, fuel oils, metal manufactures, tobacco, gunny bags, yarns, machinery, vehicles, etc. According to countries, exports and imports to and from England stood at 80 per cent and 50 per cent respectively of the total amount, being followed in order by Japan, Holland (including possessions), the West Indies, China, and Germany.

Reviewing the trade with Japan, exports for the five months amounted approximately to 2.75 million ticals, or about 5 per cent of the total exports, while imports stood at 11.22 million ticals, or 28 per cent of the total imports. The principal items in exports

were rice and teak, and those in the imports were cotton manufactures, rayon, zinc plates, etc.

### Netherlands East Indies

In the Netherlands East Indies an improvement in the Treasury finance is apparent, the actual result for the previous fiscal year having shown an increase in revenue of 9 million florins over the Budgetary estimate, due mainly to the increased receipts in the export duty on native rubber and also to the greater profits in the Government tin industry. On September 26, however, the Netherlands placed an embargo on the export of gold, and the Netherlands East Indies having followed suit on the 27th, the general market became chaotic and commodity prices displayed a sharp rise, threatening the national livelihood. The Government thereupon acted promptly to prevent an unwarranted increase in prices of both imported and home-produced foodstuffs and articles of consumption. Various other measures to stabilize the national life were adopted: on October 17 a decree to control the prices of goods, services, and rents was issued; with a view to prevent the prices of imported goods from a rapid rise the Government decided upon a reduction in the import duties; and on November 5 a maximum price for special commodities was fixed. For the purpose, in addition, of counteracting the decrease in revenue arising from the reduction in the import duty it was decided that exports of the most profitable products, other than sugar, coffee, tobacco, white pepper, etc., should be subject to a 2 per cent specific duty. Owing to these opportune measures commodity prices merely rose gradually, indicating a general prosperity towards the end of the term.

Reviewing foreign trade as a whole, exports and imports for the six months from June to November amounted respectively to 267 million florins and 143 million florins, showing in both cases increases of 49 million florins and 6 million florins, with the result that the excess of exports over imports reached 123 million florins. With regard to trade with Japan, the Dutch-Japanese Maritime Agreement was signed in the previous term. The negotiations, however, on the trade in general have not reached a settlement as yet, and the import quotas on Japanese goods have been gradually reduced, exerting a continually heavier pressure upon transactions. Thus, imports from Japan during the six months ending November fell off by 5 million florins to 33 million florins, compared with the corresponding months of the previous year, owing to the rapid decline in cotton yarn and piece goods, while exports to Japan increased by 2.8 million florins to 12 million florins, due to activity in rubber, sugar, and maize.

### In the Philippines

In the Philippine Islands in this, the first year of independence, the situation of the Treasury finance has been improving, with indications of an increase in the revenue. The general commodity markets were as a whole lively, and foreign trade continued favourable. The first regular session of the National Assembly, which opened in the middle of June, passed 149 bills, including, *inter alia*, the Bill providing for the increase in the rate of the Customs tariff on the imports of beer and in the excise; the Bill providing for a flexible tariff by authorizing the President to alter the rate of duties on imported goods; the Bill to inaugurate the "National Power Corporation"; the Mining Bill, etc.

The bills affecting foreign relations, such as, for instance, the Alien Retailers Restriction Bill; the Bill limiting the number of foreign employees; the Registration Tax Bill; the Luxury Tax Bill; the Bill to restrict foreign vessels from engaging in the coast-wise trade; the Bill to enable regulations to be issued affecting foreign banks, etc., did not come up for discussion, and the session was adjourned.

The special session of the Assembly in October passed a Bill authorizing the President to negotiate with the President of the United States for a Trade-Economic Conference, and providing the necessary funds; the Bill to create a public corporation to be known as the "National Development Corporation"; the Bill to create a public corporation to be known as the "National Produce Exchange"; the Bill to require a 20 per cent *ad valorem* inspection fee on all shells exported from the Philippines, etc. The bills affecting foreign relations were again not discussed, and the Assembly was adjourned.

The urgent question facing the Philippine Islands at present seems to be the Philippine-American Trade-Economic Conference.

A thorough investigation was made through the medium of the special committee appointed for that purpose, while experts were dispatched from the United States to examine the economic condition of the country. It was decided that the President should visit the United States within a short period and enter into negotiations regarding an economic "Verein" between the two countries. The Government is thus making efforts towards protection of home industries. It is to be noted that the erection of a brewery is now contemplated, in anticipation of the imposition of a prohibitive tariff of \$16.40 per 100 litres on Japanese beer.

In industry, gold mining was so active that the share prices experienced a boom. To meet this the Government appointed a committee to control the mining market, and, at the same time, considered the question of an increase in the rate of fees for certificates to brokers, and the imposition of a stock exchange tax, as well as of a turnover tax on stocks, shares, and other securities.

The output of gold for the term amounted to 24 million pesos, showing an increase of 7 million pesos as compared with the corresponding term of the previous year. Regarding rice, although the country was visited by a typhoon at the beginning of October, the damage done to crops was not so serious as was at first apprehended, and the National Rice and Corn Corporation decided upon a reduction in the selling price of imported rice. As regards sugar, 80 per cent of the export quota to the United States for the year 1935-36 having already been shipped in the previous term, exports during the term amounted only to 220,000 tons, inclusive of the 1936-37 quota, due to which the sugar market remained dull.

The total exports and imports for the five months ending November amounted respectively to 82 $\frac{1}{4}$  million pesos and 82.73 million pesos, showing an increase of 0.74 million pesos and 4.9 million pesos, when compared on the usual basis, with the result that the excess of imports over exports reached 0.48 million pesos.

### The Republic of China

With our neighbour China steady progress is being made in the unification of the country. The Second Plenary Session of the Central Executive Committee, which was held in July in Nanking, resolved that the South-west Executive Committee of the Kuomintang and the South-west Political Council should be abolished. Subsequently, on the flight from Canton of General Chen Chi-tang, who had been supreme in the south-western districts, Kwangtung Province came under the Central Government, and Kwangsi Province in September fell into line.

The Canton-Hankow Railway commenced through traffic over the whole line from September 1, while aerial services were opened both with England and America, Hongkong being an intermediate stage. In North China a Sino-Japanese Aerial Corporation connecting certain northern cities with Japan and Manchuria was also established. The construction and extension of railways and main roads have also been progressing steadily throughout the whole country.

The new currency system celebrated its first anniversary on November 3. Few, if any, natural disasters having occurred, agriculture was reported to be showing a better yield than in recent years. As a result, the purchasing power of the peasant farmers increased considerably, and general conditions appear to have taken a turn for the better.

The report of the imprisonment of General Chiang Kai-shek and his suite in Sian on December 12 caused a feeling of uneasiness, but a satisfactory settlement having been reached after a period of two weeks, matters were rapidly restored to a normal condition.

Reviewing foreign trade, exports and imports amounted respectively to 373 million dollars and 482 $\frac{1}{2}$  million dollars, each showing an increase of 56.6 million dollars and 108.8 million dollars, as compared with the corresponding term of the previous year, with the result that an excess of imports over exports to the amount of 109 $\frac{1}{2}$  million dollars, as against 57.3 million dollars for the corresponding term of last year, was recorded.

According to countries, exports ranged in the order of the United States (85 million dollars), Japan (67 million dollars), Hongkong (59 million dollars), and England (38 million dollars), while imports ranged in the order of the United States (103 million dollars), Japan (86 million dollars), Germany (71 million dollars), and England (56 million dollars), showing in all cases considerable increases as compared with the previous year.

Reviewing trade according to the principal commodities, in exports there were increases in cattle and animal products of 15 million dollars, in wood-oil of 9 million dollars, and in cereals of 7 million dollars, while a decrease to the total of 6 million dollars in peanuts and peanut oil was recorded. On the side of imports, metals and munitions registered a considerable increase of 25 million dollars in either case, which was partly offset by a decrease of 11 million dollars in cereals.

With regard to the movement of gold and silver, the statistics of the Customs House show that imports of gold amounted to 0.2 million Customs Gold Units, against exports of 19 million Customs Gold Units to England. Imports of silver registered 1.6 million dollars, while exports amounted to 151 million dollars, of which sum 115 million dollars went to the United States and 36 $\frac{1}{2}$  million dollars to Hongkong.

Reviewing the conditions prevailing in the different localities. In Shanghai good effects from the national unification, from the successful new currency system, and from the bumper crop throughout the country were evidenced by the fact that towards the close of the term business recovered, and the movements of cargo became brisk, while cotton spinning and other industries revived. Foreign trade was also active, exports and imports amounting respectively to 188 million dollars and 277 million dollars, each showing increases of 25 million dollars and 82 million dollars over the corresponding term of the year previous.

The note issue of the three Government banks under the new currency system, according to the official returns, continued to increase month by month, rising from 856 million dollars at the end of June to 1,080 million dollars at the end of the term, and it is estimated that the outstanding balance of the note issue of other banks has also increased. The foreign exchange continued stable, the quotation on London fluctuating within a small margin between 1 $\frac{1}{2}$  d and 1 $\frac{1}{2}$  d. Even immediately after the Sian incident the market did not suffer any serious disturbance owing to the sympathetic attitude of the Foreign Exchange Bankers' Association and also to the timely measures adopted by the Central Bank. The index of wholesale commodity prices in Shanghai (1926=100), which stood at 106.1 in June, rose gradually to 118.8 in December. The index of imported commodity prices rose from 140.7 to 147.6, and that of export commodities from 97.5 to 102.9. The improvement in domestic prices was more pronounced.

The neighbourhood of Hankow was favourably affected by the settlement of the political situation and by the plentiful crops. The yield of cotton in Hupeh recorded a treble increase over the previous year; and including wheat and rice in the provinces of Hupeh and Hunan, the production was reported to reach a total of 370 million dollars. Business in general was very active. Cotton yarns and piece goods especially showed the highest prices on record in the past few years, and almost all the cotton mills in Hankow and Wuchang recommenced operations. Accordingly, the traffic on the Yangtze River was active, the tied-up vessels resuming the service. Exports and imports amounted to 25 million dollars and 21 million dollars, an increase of 3 million dollars and 5.9 million dollars. Owing to the requirement for funds in the interior, money was temporarily in demand, but was as a whole quiet.

### In South China

Turning to the South, in Canton, with the settlement of the political crisis, both fiscal and monetary affairs have been under the control of the Central Government since August. The withdrawal of silver and the adjustment of the taxation system progressed, and the value of the local small coin notes was maintained at 148.9 dollars against 100 dollars National Currency and 153.4 dollars against 100 Hongkong dollars. Exports and imports (both foreign and domestic) for the term were estimated respectively at 38.9 million Hongkong dollars and 73.8 million Hongkong dollars, showing increases of 40 per cent and 46 per cent over the corresponding term of the previous year. The increase in the former was accounted for by raw silk and cotton piece goods, while that in the latter was due to activity in rice, wheat flour, sugar, etc.

In Hongkong exports and imports amounted respectively to 187 million dollars and 240 million dollars, showing an increase of 59 million dollars and 66 million dollars. Increases were noticeable in trade with all the principal countries, that with China being the most remarkable. Notes in circulation, which stood at about 120 to 130 million dollars in the latter half of the previous year, increased

continually, reaching over 160 million dollars on certain occasions in the term. Money remained far easier than in the previous period. Foreign exchange, in spite of considerable speculation due to the fall of the Canton Government, to the uncertainty of the French franc, to the Sian incident, etc., was under the effective control of the issuing banks. Quotations on London fluctuated within the very small margin of  $\frac{2}{3}$ d. between  $1\frac{3}{4}$ d. the highest, and  $1\frac{1}{4}$ d. the lowest, thus showing a remarkable stability in comparison with previous years.

Coming to the North, in the districts of Peiping and Tientsin, the crops of cotton and other produce were generally plentiful. Owing to the delay in the arrival of stocks on the market caused by the reluctance of the farmers to sell and by the political unrest in the interior, the price rose, and there is an indication of an increase in the purchasing power of the farmers. In Tientsin exports and imports for the term amounted respectively to 64 million dollars and 40 million dollars, showing an increase of 14 million dollars and 4 million dollars. Some improvement in Japanese investments in cotton spinning, electricity, petrol, glass, etc. was noticeable. In Peiping business was also active, but the livelihood of the poorer classes was seriously threatened by the rise in commodity prices and in the increase in the value of the copper coins. In Tsingtao exports fell off by 2.7 million dollars to 22 million dollars, due to inactivity in peanuts and peanut oil, while imports improved by 7 million dollars to 28 million dollars, resulting in an excess of imports over exports.

### Trade of Manchoukuo

In Manchoukuo the abolition with certain reservations of Japanese extraterritoriality took effect from July 1, Japanese becoming subject to the taxation and industrial laws, while the Law for the Adjustment of Concession Rights was promulgated in September. The Court Organization Law, the Electric Communications Law, the Postal Service Law, the Bonding Law, the Border Zone Law, etc. were successively inaugurated, by which the administration in the country became better organized and peace and order were more effectively secured. The construction of new railway lines was extended during the term by an additional 700 kilometres. In October the Second National Road Construction Plan was decided upon, by which the building of national roads to the mileage of 12,000 kilometres and the construction of 37 bridges over the principal rivers were to be completed within five years. The companies newly established during the term were those connected with life insurance, armament, light metal industries, scales manufacture, etc. The Government established also the Hydro-Electric Construction Bureau for the purpose of generating electricity on the Sungari River.

The Treasury finance continued favourable, the actual revenue from taxation for the first eleven months of the third year of Kangte (1936) showing an increase of 21 million yen. The Budget for the present fiscal year estimates in the ordinary account revenue and expenditure at 248 million yen, or an increase of 28 million yen over the figure for the previous year. Owing, however, to the adoption of a positive policy for the encouragement of industry, the Budget for the extraordinary account estimated new flotations to the total of 150 million yen.

In the money market the national currency continued stable. In conformity with the abolition of the issue of the chaopiao (silver yen notes) the exchange in chaopiao in Dairen and in Hsinking was closed, and transactions in the Dairen Produce Market are now on the gold yen basis. In December the Industrial Bank of Manchou was established, taking over the business formerly carried on by the Manchurian offices of the Bank of Chosen as well as by the Shoryu and Manshu Banks. Demands for the national currency notes increased, and the issued amount rose from 134 million yen at the beginning of the term to 254 million yen at the end.

In the commodity market the price of soya beans, owing to the shortage in stocks, rose to Y.8.49 for cash delivery in Dairen in July, and further to Y.9.80 in September. With the arrival, however, of the new crop at the end of October the market slumped heavily, and after touching Y.5.95, closed the term at Y.7.66. Prices of kaoliang, millet, red beans, and cereals rose simultaneously, as a result of which peasant farmers throughout the country enjoyed greater prosperity than hitherto experienced since the foundation of the Empire.

Regarding the foreign trade, in conformity with the application in Japan against Australia of the Law for the Safeguarding of Commerce, an Emergency Trade Control Law was promulgated in August, placing a licensing system on the importation of wheat, wheat flour, wool and rice. Owing, nevertheless, to the activity in the staple exports, and also to the improvement in the national purchasing power, exports and imports, including the Kwangtung Province, amounted respectively to 258 million yen and 353 million yen, showing in each case an increase of 62 million yen and 47 million yen, with the result that the excess of imports over exports reached 95 million yen. Thus, taking the whole year, exports and imports reached the record figures of 603 million yen and 692 million yen.

In North Manchuria both farmers and traders prospered, due to the good yield and the high prices of produce in general. The shipments of the Manchurian staples through the ports of Seishin and Rashin are increasing annually. Of the soya bean freights over the Government railways totalling 680,000 metric tons it is estimated that 200,000 metric tons have passed through these ports.

With the sharp rise in the price of wheat and flour, due to the suspension of imports from Australia, the flour milling industry became very active in North Manchuria, the production increasing to two and a half times as much. The demand for perilla suffered a sharp fall due to the imposition in the United States of an import duty; after the middle of the term, however, with the commencement of shipments to Europe and also with active demands from Japan, the market became brisk. The soya bean-cake industry was adversely affected by the high price of the raw material and the increased use of the chemical fertilizers as a substitute, and the bean oil mills remained depressed throughout the term.

As regards Dairen, exports were favourably influenced by the active demand for soya beans from Europe as well as from Japan, and also by the active shipments of commodities to North China, with the result that the amount totalled 167 million yen, showing a sharp rise of 27 million yen as compared with the corresponding period of the previous year. Imports likewise recorded a rapid rise of 29 million yen, reaching 260 million yen, for which the favourable condition in the interior and the active demands for re-export to North China were responsible.

Of the imports, machinery amounted to 55 million yen, textiles to 59 million yen, building materials to 17 million yen, and food-stuffs and tobacco to 27 million yen. Wheat flour, imports of which had registered a very considerable amount in the previous years, suffered a heavy decline of 50 per cent, due to restrictions in Manchoukuo of imports from Australia.

Regarding monetary conditions, although the issue of the silver yen notes was abolished as from October 1, the market remained quiet, and the redemptions at the end of the term totalled 1,682,000 silver yen, the amount in circulation shrinking to 533,000 silver yen. In conformity with the realization gradually of the unification of the Manchurian currency, the wide circulation of the Manchoukuo notes in Kwangtung Province has become noticeable. Deposits in the member banks in Dairen totalled 308 million yen at the end of the term, against which advances stood at merely 163 million yen. Comparing these figures with those of twelve months previous, the former recorded a sharp increase of 140 million yen, while the latter showed but a nominal increase of 15 million yen. Since the withdrawal of the silver yen the exchange on Shanghai has been operated on the Japanese yen basis, the quotation ranging between Y.102 and Y.104, with a considerable decrease in the volume of transactions.

### New Foundries

The Japan Iron Manufacturing Company has decided to build two new iron foundries in connection with its five-year plan for increasing the production of pig iron and steel. Wanishi, in the Hokkaido, and Sakai, in Osaka Prefecture, are likely to be selected as sites. Japan Iron's five-year program involves an increase of the production of pig iron to 4,700,000 metric tons out of Japan's total estimated annual production of 5,500,000 metric tons, and an increase of the production of steel to 2,000,000 metric tons out of the country's total estimated annual production of 5,000,000 metric tons. The new plants will have a capacity of 700,000 metric tons a year.

# The Port of Hongkong\*

By Professor C. A. MIDDLETON SMITH, M.Sc., M.I.Mech.E. (Taikoo Professor of Engineering in the University of Hongkong)

**H**THE life-blood of the Colony is shipping" is a phrase constantly quoted in Hongkong, which is essentially a port; it is also a Crown Colony of great political importance and commercial value to the British Empire, situated on the S.E. coast of China. It is not, to any extent, a manufacturing center, its most flourishing industries being those connected directly or indirectly with shipping, such as docks and warehouses, banking and insurance undertakings.

The importance of Hongkong, as a port, and as the center of British interests in the Far East, has grown rapidly with the increase of the trade of China with foreign countries. That is revealed by the astonishing increase in the revenue of the local Government, which in 1910 was seven million dollars, and had reached in 1933 a total of 32 million dollars.

Hongkong Island is only about 32 square miles in area. Geographically, the Colony is a part of China—the island, being separated from the Chinese mainland by a narrow channel of only about quarter of a mile (at its narrowest), known as the Ly-e-mum Pass. There is also about 380 square miles of British territory on the mainland. The two cities Victoria, on the island, and Kowloon on the mainland, are separated by a channel about one mile wide. The harbor of Hongkong consists of a magnificent sheet of water. Within the harbor limits is an area of about 11 square miles in extent; the harbor has been characterized by an authority on economics, Dr. H. B. Morse, as one of the few harbors in the world which may be called perfect.

Most people who have never visited Hongkong would say "It is a seaport in China belonging to Britain." That is but a fraction of the story. A Crown Colony, furthermost from the center of the British Empire, it is of all the component parts of

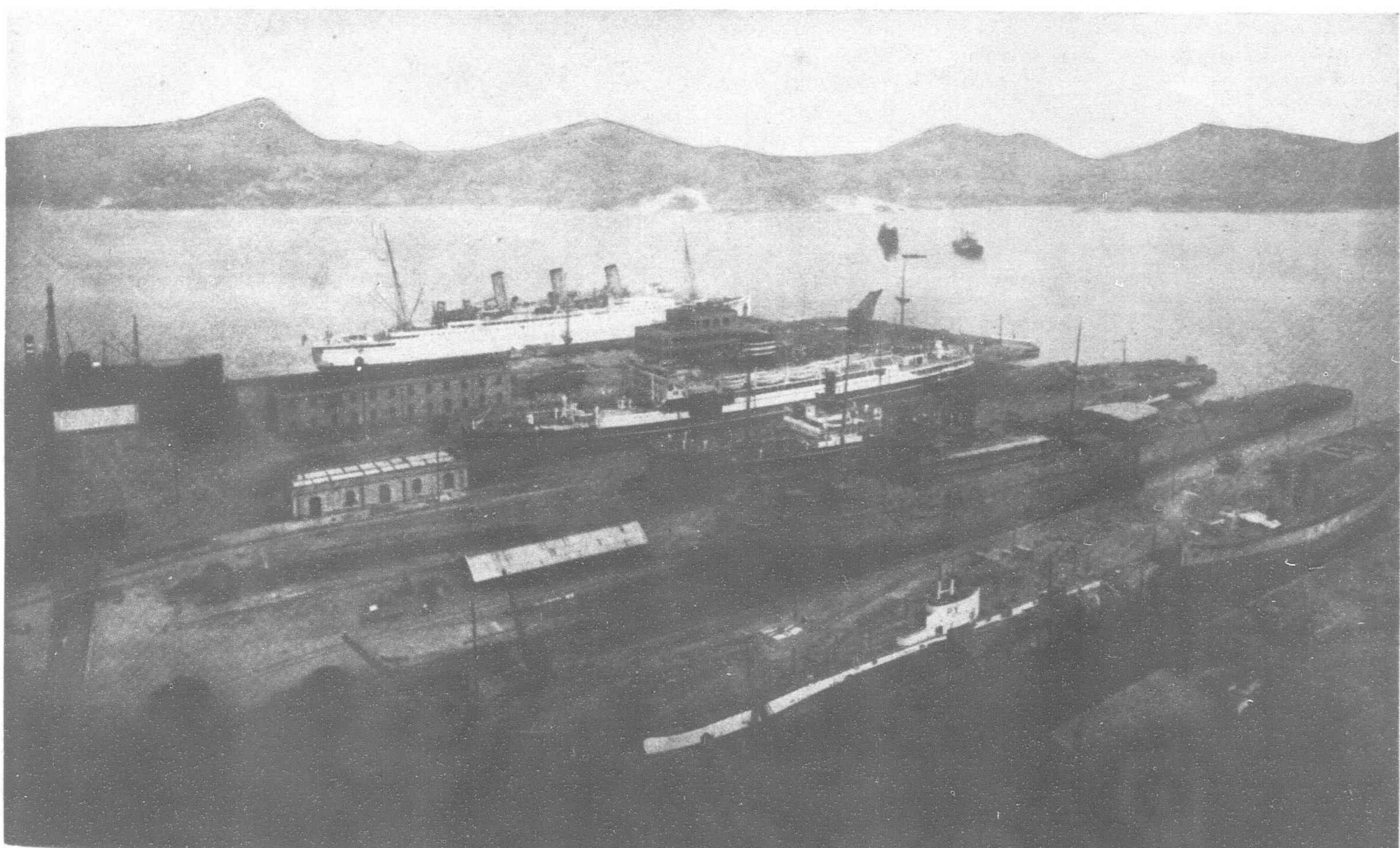
the Empire, the most romantic and perhaps the most remarkable. It is at once an inspiration and a source of pride to visitors from "home." No other people but the British would have transformed the barren rock, which was a pirate's lair less than a century ago, into an important center of the shipping industry, and a place where order and justice is guaranteed to all races and creeds. A Chinese remarked "China ceded to Britain a hill of granite and has since received, in return, a mountain of gold."

Hongkong is now a wealthy and picturesque outpost of Western civilization in the Far East. It is a charming place, with one of the most lovely harbors in the world, a harbor which has the beauty of a Scottish loch and the appearance of a broad lake surrounded by jagged hills. In it are to be seen ships flying the flags of many nations, numerous Chinese junks, and an almost countless number of native "sampans" or small rowing boats. Incredible as it may seem, families live on these "sampans"; children are born on them and spend most of their lives afloat in, or around, the harbor of Hongkong.

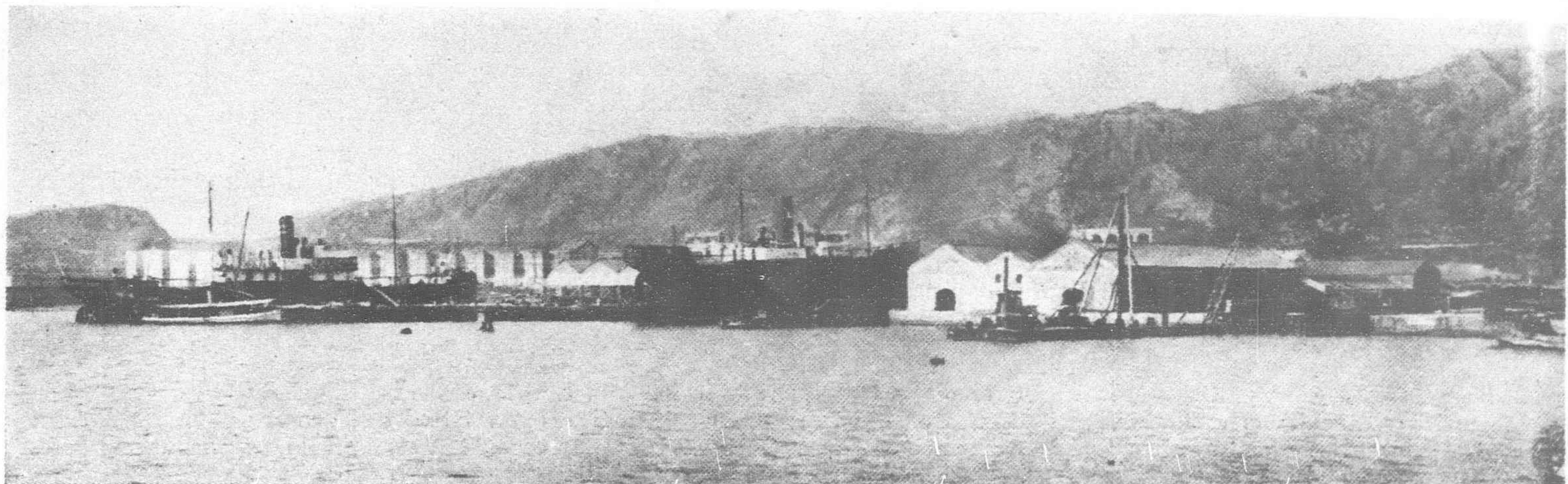
## An Important and "Free" Port

It is a "free" port; there are excise duties on alcohol and tobacco, but no customs barriers to trade. It is one of the few "free" ports left in this era of tariff wars. The fact that it is "free" is an advantage to the distributing trade, but retards the development of local manufacturing industries. There is a desire in some circles in the Colony to make an arrangement with China to bring Hongkong within the Chinese Maritime Customs Service,

\* The Dock and Harbor Authority



A view of the Taikoo Dockyard and a portion of Hongkong harbor



View of Shipyard of W.S. Bailey & Co., Ltd., Hongkong

so as to allow local industries to be within the Chinese tariff wall, which, in recent years, has been rising rapidly. The idea is to stimulate local industries, but the proposal has not met with any great support.

In respect to tonnage entered, and cleared, Hongkong is now one of the largest ports in the world; larger than Southampton or Marseilles, Calcutta or any port in South America. It is a most convenient distributing center for the goods from abroad, and an obvious outlet for the produce of South China. There is an incessant flow of Chinese emigrants to and from Malaya, the Dutch East Indies, and elsewhere to South China, all of which passes through Hongkong.

In 1841 Hongkong was ceded to the British. Trading conditions in Canton, the only port in China (previous to the cession of Hongkong) available for foreign trade, had become impossible, owing to the constant irritation to Europeans caused by pin-pricks from Chinese officials. British ships had, before 1841, often anchored in the deep and well-protected harbor of Hongkong, although the Portuguese Colony at Macao, forty miles south of Hongkong, was a residential center for Europeans, as no European women were then allowed in Canton. The island of Hongkong was, in those days, known for the purity of the water, obtainable from the hillside streams; foreign ships called there to replenish their stores of drinking water. The Chinese words "Hongkong" have been translated as "Sweet Waters."

#### British "Luck and Pluck"

The pioneers of shipping and trade of the early days in Hongkong had very different conditions to those of to-day. As late as 1867—some 26 years after occupation by the British—a local newspaper wrote bitterly of the "pestiferous island of Hongkong," this "charnel house for troops and traders," and demanded its abandonment in favor of some more salubrious locality. Between

May and October, 1843, 24 per cent of the troops and 10 per cent of the European civilian population died of fever. In 1861 the death rate among the white people was 64.8 per 1,000. During the last 30 years, it has been about 12 per 1,000. But even in the early days the harbor was too valuable an asset to relinquish, in spite of the dreadful casualties in the early days. And so "British luck and pluck" finally triumphed and created this famous modern port.

Modern science has, however, brought about great changes in the Far East. The conditions of life for white residents in Hongkong in these days are by no means unpleasant. Practically the only draw-back is the humid summer climate; but there are many other compensations, including cheap and industrious labor. In these days even the enervating humidity of the tropics can be (and is) eliminated by air-conditioning apparatus; and an ideal climate can be manufactured in offices, cinemas and homes in the tropics, thus increasing human efficiency and comfort.

#### Early Shipping Figures

The first Hongkong newspaper was published in 1857. Two of the four pages of which it consisted were occupied with a list of ships in the harbor or expected that day; of the 122 ships listed only six were steamers. The biggest was the P. & O. *Ava*, of 1,620 tons, from Calcutta. There was also an American sailing ship *Wizard* from San Francisco, of 1,600 tons. In 1935 a ship of 42,000 tons lay alongside a wharf in Hongkong.

In 1857 days "telegraphic" messages were sent to Trieste for transmission to London, etc. The charge was £1 sterling to Trieste, and 32 shillings for telegraphing 20 words from Trieste.

In the early days the P. & O. and other shipping companies built slipways on the island. In 1857 the first dry dock in the Colony was commenced at a fishing village on the South of the island, re-named Aberdeen by some Scot who found the Chinese



British warships moored in Hongkong. This view is taken from the south side of the harbor (Hongkong Island) and shows Kowloon on the North side of the harbor, with the hills behind

name too clumsy. The dock there is still occasionally in use, and is owned by the Hongkong and Whampoa Dock Co., Ltd., whose main docks and repair shops are on the mainland at Kowloon.

### A Terminal Port

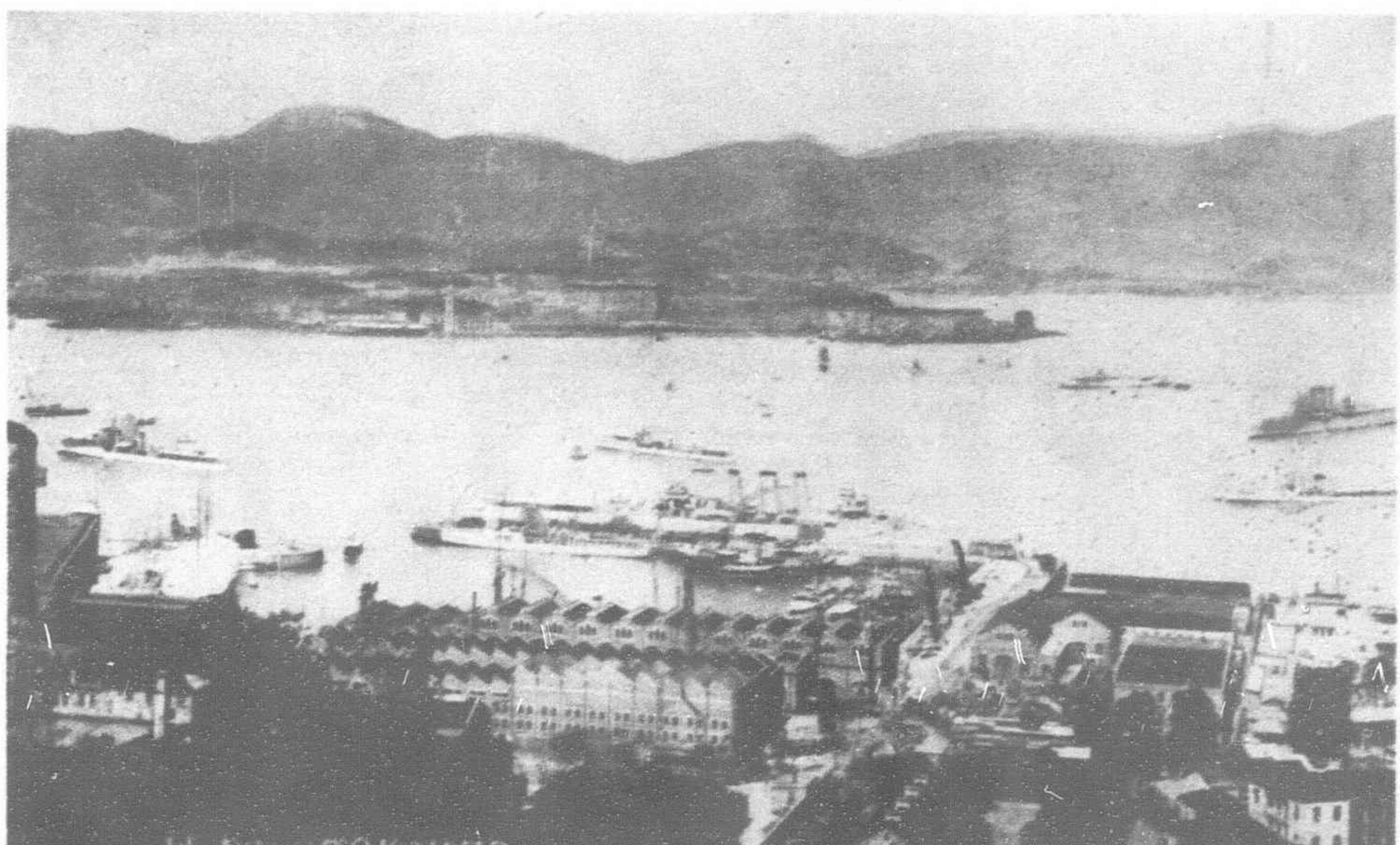
Hongkong is the keystone in the arch of British trade and political interests in China. It is not only a great commercial port, it is the base of the British defence forces of the Far East. Warships of all descriptions, from submarines to an air-craft carrier, are to be seen lying off the Royal Naval Dockyard, where a large British staff and about 3,000 Chinese workmen are employed. An extensive aerodrome, on reclaimed land on the mainland, is used by civil and Admiralty aircraft. Troopships come and go; three battalions of British white troops, various attachments (artillery, engineers, ordinance, etc.), two Indian regiments and the General Staff of the China Command, remind us of its strategic value to the Empire.

Its importance in the world war for trade is difficult to exaggerate. A triumph of British administration, engineering skill, and commercial enterprise, it is to-day a well-equipped port, with ample berthing accommodation for steamers of over 40,000 tons. It is the terminal port for vessels plying between the Western ports of America and those of China, and also for certain ships running between Australia and the Far East. Two large, and several small, commercial dockyards are available for ship repairs. In two of them a few ocean-going steamers and many coasting steamers have been built.

A railway connects Hongkong and Canton. It has been authoritatively stated that through traffic between Canton and Hankow in Central China, will be run towards the end of 1936. That will inevitably bring about increased trade for the Port of Hongkong. It should also make possible, in due course, the rail journey from Hongkong to Calais.

Hongkong is the headquarters of most of the important British controlled limited liability companies in China, including the great Far Eastern financial institution, the Hongkong and Shanghai Banking Corporation, Ltd.

Hongkong, under British rule, soon became an important center of Western-style school education. About fifty years ago a College of Medicine was founded, the famous Chinese leader, Dr. Sun Yat-sen, being the first graduate. In 1912 a University was opened with Faculties of Medicine, Engineering and Arts.



A view showing the Royal Naval Dockyard, Hongkong, in the foreground, and Kowloon across the harbor

### A Famous Shipping Firm

Until about 1831 the old East India Company held the monopoly of the British shipping trade in the Far East. Their ships anchored off Whampoa, a few miles from the sea up the Canton River, where the cargoes were loaded or unloaded from or to native craft. In those days Canton was the only port in China open to foreign trade. When the monopoly expired (1831) other British interests came into the shipping trade, the most famous then being the P. & O. S.S. Co., Ltd.

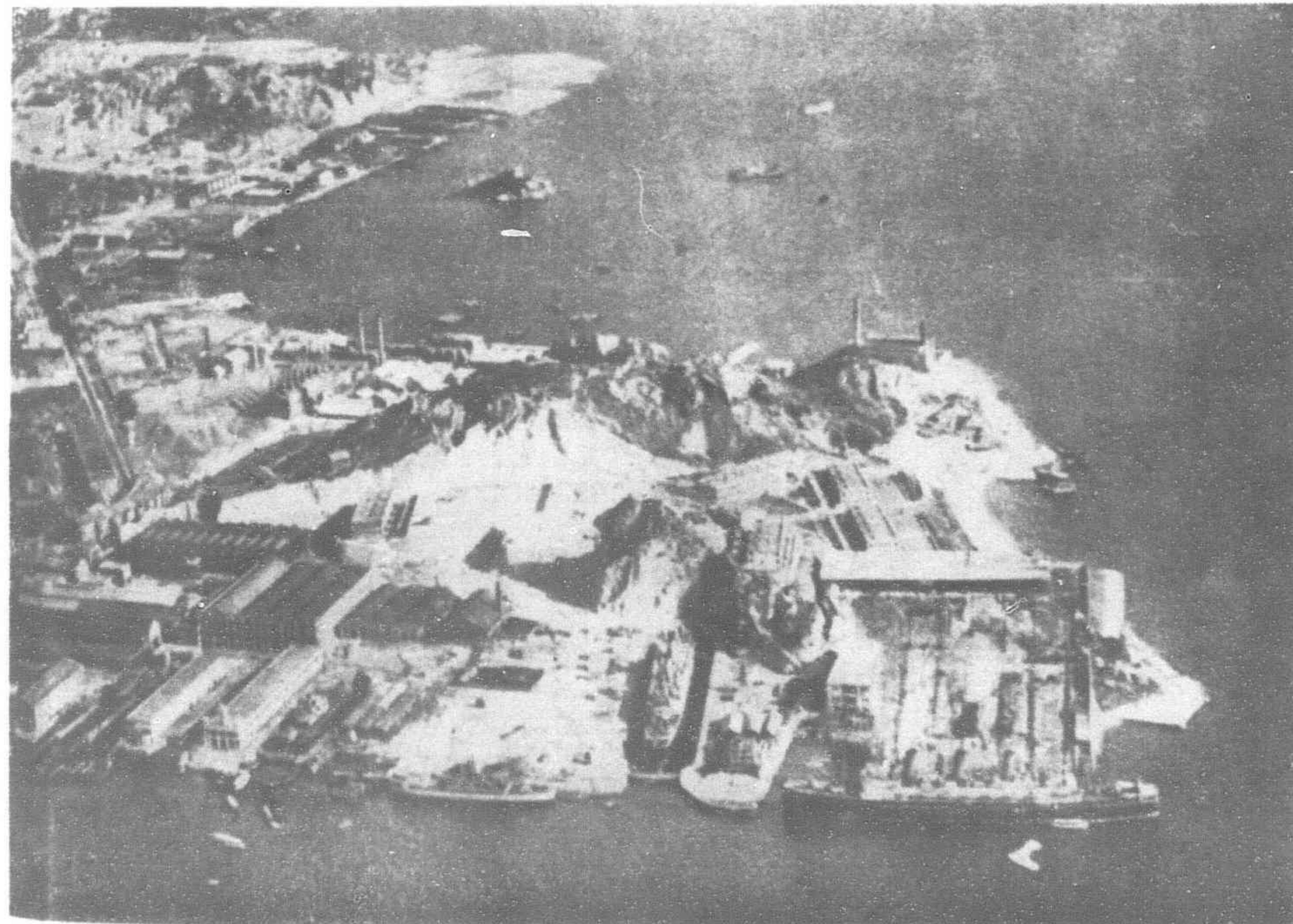
Since those early days a large number of British (and other nations) shipping companies have realized the great advantages of Hongkong as a port of call. The most recent development has been the fairly frequent visits of huge "round the world cruise" liners, bringing large numbers of American and European tourists to the Colony.

While it may be invidious to make comparisons, there can be no doubt that to-day, so far as general marine interests in the Far East are concerned, the firm of John Swire, Ltd., London, and their associates, are the most important of the British shipping firms trading in the Far East. Those firms have concentrated almost entirely on shipping and allied interests, such as warehouses, a dockyard, insurance, etc. They are not general merchants. They

have establishments with shipping offices in Hongkong and other Far Eastern ports. A subsidiary firm, Messrs. Butterfield & Swire, act as agents for the large fleet of steamers (under the John Swire, Ltd., ownership) flying the "red duster" and the flag of the China Navigation Co., Ltd., and plying between Far Eastern ports. They also manage the extensive shipping interests of the Blue Funnel Line (Messrs. Alfred Holt & Co., of Liverpool). In addition, the London firm control the large local works known as the Taikoo Dockyard and Engineering Co., Ltd., and the Taikoo Sugar Works.

"Taikoo" is compounded of two Chinese words, "Tai" meaning "great" and "Koo" meaning "ancient." Rather more than a quarter of a century ago, Messrs. John Swire, Ltd., and associated firms, subscribed £40,000 to the endowment funds of Hongkong University, and the University Authorities decided to name the first chair of engineering "Taikoo." The writer has had the honor to occupy that chair for 24 years.

There are many other British firms interested in shipping in Hongkong, most prominent being the P. & O. S.S. Co., Ltd., and the Canadian Pacific Steamships, Ltd. There are several British lines trading on the China Coast with vessels registered in Hongkong.



Aerial view of Kowloon Docks (Hongkong and Whampoa Dock Co., Ltd.)

### The Hub of a Wheel

The first steamship company to be formed in China was the Hongkong Canton and Macao Steam Boat Company, formed in 1865 by the British. There have been efforts to form purely Chinese shipping companies, but the Chinese, except for a few recent cases, have not evolved from the family system of co-operation in commerce. A more modern attempt was made, many years ago, in connection with shipping. The China Merchants Steamship Co. was formed, and at one time had a fleet of 31 ships with a total tonnage of 60,000 tons. It is now a Chinese Government concern.

The Colony of Hongkong consists of the following:—

|  | Square Miles |
|--|--------------|
| Hongkong island, ceded by China by the Treaty of Nanking of 1842, with an area of approximately .. ..                | 32           |
| Kowloon peninsula, ceded by China in perpetuity by the Peking Convention of 1860, about .. ..                        | 4            |
| Territory behind Kowloon peninsula, ceded in 1898 by China in a lease of 99 years, and consisting of the following:— |              |
| Mainland .. .. .. 286 sq. miles  | 286          |
| Neighboring islands .. 90 sq. miles  | 90           |
|  | <hr/>        |
| Total approximate area .. ..   | 412          |
|  | <hr/>        |

The geographical position of Hongkong makes it like the hub of a wheel, the spokes being the transport lines along the rivers of China and to other ocean ports.

By water routes, and in statute miles, the approximate distances between Hongkong and the important nearby ports are as follows:—

| Hongkong to :—                                | Nautical Miles |
|---|----------------|
| Canton (capital of Kwangtung province, China) | .. 83          |
| Macao   | .. 40          |
| Amoy .. .. .. .. ..                           | .. 285         |
| Shanghai .. .. .. .. ..                       | .. 832         |
| Manila .. .. .. .. ..                         | .. 630         |
| Singapore .. .. .. .. ..                      | .. 1,449       |
| Kobe .. .. .. .. ..                           | .. 1,378       |
| Yokohama .. .. .. .. ..                       | .. 1,775       |
| Vancouver .. .. .. .. ..                      | .. 5,950       |
| San Francisco .. .. .. .. ..                  | .. 6,500       |
| Bombay .. .. .. .. ..                         | .. 3,900       |
| London .. .. .. .. ..                         | .. 9,715       |

With modern transportation, Hongkong may be reached by steamers from Shanghai in about 40 hours, and from Manila in about 36 to 40 hours; by air from Manila in about five hours. The weekly air-mail service, Penang to Hongkong and vice versa, does the journey in 36 hours. London to Hongkong is now 10 days by air.

Since it is geographically a part of China, and its population overwhelmingly Chinese, any important happenings in China in a political or commercial way, always more or less affects Hongkong.

### Hongkong Harbor

The development of the natural harbor of Hongkong, a harbor of almost unrivalled excellence, has been left almost entirely to private enterprise.

From time to time suggestions have been made to form a Port Authority—as in Singapore—but with no result. It is, however, significant that all pier and ferry leases expire in 1949, and probably some reorganization will be planned before that date.

Until recent years the movement of commerce to and from Hongkong was simple. It was attracted by the natural advantages and there was little competition. It made but little difference, physically, with the business of the port whether quays or piers were available, so long as the water in the harbor was deep.

Labor was cheap, ships could load and unload into junks at their moorings, and in many cases the junks distributed the cargo to other places along the China Coast. Strategic water fronts have



A Chinese junk, drying sail. The junk is the chief distributor of cargo in China

been, from time to time, acquired and held by private enterprise, for storage space; for cargoes became more and more in demand, as the volume of trade increased. And so, on both sides of the harbor, there are now piers, quays, godowns, dockyards, etc.

From the earliest days surveys of the harbor have been made. A Report on Harbor Improvement, made by Mr. J. F. Boulton, an Executive Engineer of the Public Works Department to the local Government (1904) refers to Admiralty charts of 1843, 1874, 1885, 1888, 1890, 1894, 1903.

He mentions that the 1874 chart was first published in 1843 and went through many editions, the last available (at 1904) bearing the date 1903. The first survey was made in 1841, but it was, later, impossible to re-establish the datum, so that first survey was not of much use for comparative purposes. There are references to five Admiralty charts of 1903.

Mr. Boulton discussed in detail problems of silt, dredging, etc. He estimated that his tentative suggestions for dredging would take 10 years to complete, and that a further deposit of half-a-fathom of material would take place between 1893-1915. His scheme involved dredging 18,000,000 cubic yards of material, or say 27,000,000 tons, at about eightpence a ton, or £90,000 sterling a year for ten years. In the early days the harbor limits were smaller than those of to-day.

It has been recently estimated that eight million cubic yards of material have been deposited over the harbor since 1893. It is therefore obvious that extensive and constant dredging must be done in these days. The local Government carries out this essential duty.

The increasing cost of labor, and the possibility of the deflection of trade, led the Government of the Colony to instruct the Port Engineer, in 1924, to prepare a complete scheme for the development of the port. Before that date various commercial interests had agitated for investigations *re* harbor problems. In 1920 the Shipping and Shipbuilding Committee of the Economic Resources Committee had urged the matter of Harbor Improvements as being of vital importance. They had said that "the harbor is the Colony's only asset" and that "the Government should not play with improvements suggested by amateurs."

In consequence, Sir Maurice Fitzmaurice, C.M.G., M.I.N.S.T.C.E., etc., partner in the firm of Messrs. Coode, Fitzmaurice, Wilson and Mitchell, M.M. I.N.S.T.C.E., the Consulting Engineers to the Crown Agents—referred to hereinafter as "the Consulting Engineers"—arrived in Hongkong in November, 1920.

During his stay in Hongkong the writer was in constant touch with Sir Maurice, who visited the University, giving to the (Chinese) engineering students one of the finest addresses it has been my privilege to hear.

The Consulting Engineers were asked to advise on the following matters:—

- (1) Improvements in the harbor generally.
- (2) The provision of wharves and warehouses provided with railway communication.
- (3) Improvements of a typhoon shelter.
- (4) Dredging plant generally.
- (5) An additional pier for launches and small craft.

The recommendations under (2) have not been carried out, but efforts have been made to deal with the other items.

### Dredging the Harbor

Although Hongkong is near one of the mouths of the delta through which the extensive river system of South China pours its large volume of water into the sea, the harbor is not very much affected by the silt brought down by these waters. That silt does, however, affect the Portuguese Port of Macao, some 40 miles south of Hongkong, and has been partially responsible for its decline as a trade center.

The silt that is brought down from the neighboring hills during the heavy tropical rains—a record shows 26 inches of rain in 24 hours—together with the river silt, compels the Hongkong harbor authorities to dredge the harbor.

The activity in levelling the land for building purposes, recreation ground, etc., has had the effect of making the hill-side more friable, and in consequence fairly large deposits of soil are carried into the harbor. This necessitates constant dredging to keep the fairways clear for big ships.

The depth of the harbor ranges from 24-ft. to 78-ft.

There are 51 buoys (18 Class A, for vessels 450 to 600-ft. long; 28 Class B; 5 Class C), all owned by the Government. The charges at A Class are sixteen, B twelve, and C eight (silver) dollars a day, respectively. Permission was granted for the maintenance of 54 private buoys and moorings, the fees amounting to \$2,980 (1934). Many vessels anchor in the harbor; others go alongside wharves or quays.

### Concerning Foreign and Local Shipping Trade

In 1934 some 6,245 British ships, totalling 9,725,627 tons, entered the port. Also 4,006 foreign ships, totalling 8,801,972 tons. In addition, 8,417 Chinese junks, totalling 1,352,993 tons entered.

For local trade, 10,677 steam launches entered, totalling 363,690 tons and 14,114 Chinese junks, totalling 598,005 tons.

The grand total (foreign and local trade) of vessels entered and cleared was 93,754 with total tonnage

41,914,022. The grand total for crews was 2,473,706.

There are no tonnage dues. The Government imposes Light Dues of two and four-tenths cents per ton on all ocean ships, and nine-tenths cents per ton on all river steamers entering the waters of the Colony. A charge of \$75 to \$350 for ships of 400 tons to 5,000 tons and over is made for cargo working on Sundays. The local dollar varies in value; it is to-day worth 1s. 3½d. The normal value is about 2s., but in 1920 it rose to 6s. 3d.

The Government maintains a commercial wireless station in which continuous watch is kept. The average day range is 350 miles and the night range is 700 miles.

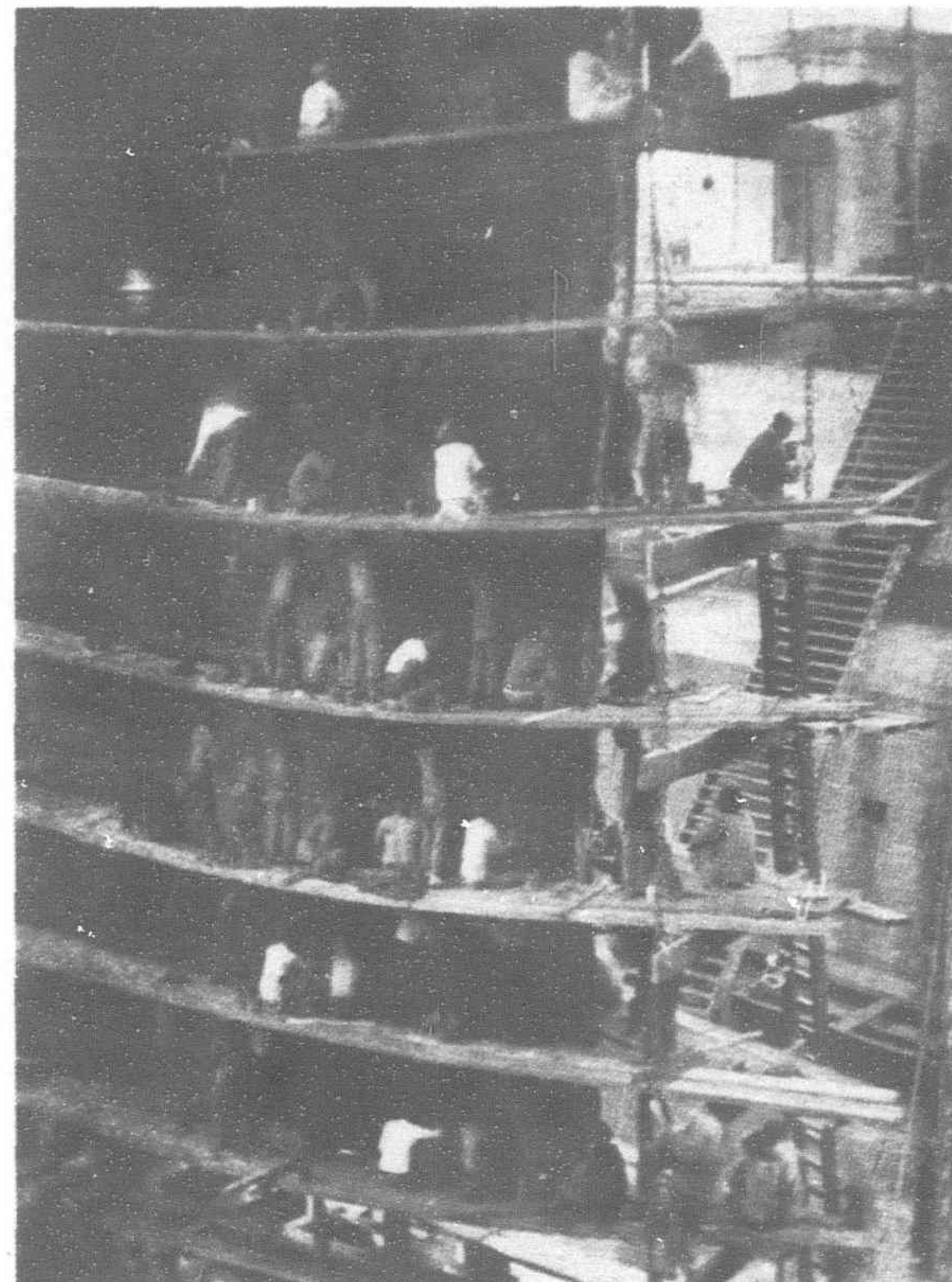
The articles imported and exported are of a very miscellaneous nature. There are as many as 650 items. The commodities handled in greatest bulk are rice, sugar, wheat-flour, tea, nuts, Chinese medicines, fish, piece-goods (cotton and silk) rattans, oil, iron, and steel, tin, machinery, etc.

It is remarkable that the bulk of the cargo conveyed into Hongkong from China for export arrives in junks. Even silk comes down from Canton that way and not by rail. It is believed that the Chinese Government officials reduce export tariffs for goods carried on native craft—an equivalent to a subsidy. Also the value of time is almost unknown to Chinese. Goods for the interior—rice, coal, chemicals, etc.—are transported by junk and river steamer. Junks do a great deal of the carrying trade all along the rivers and coast line of South China.

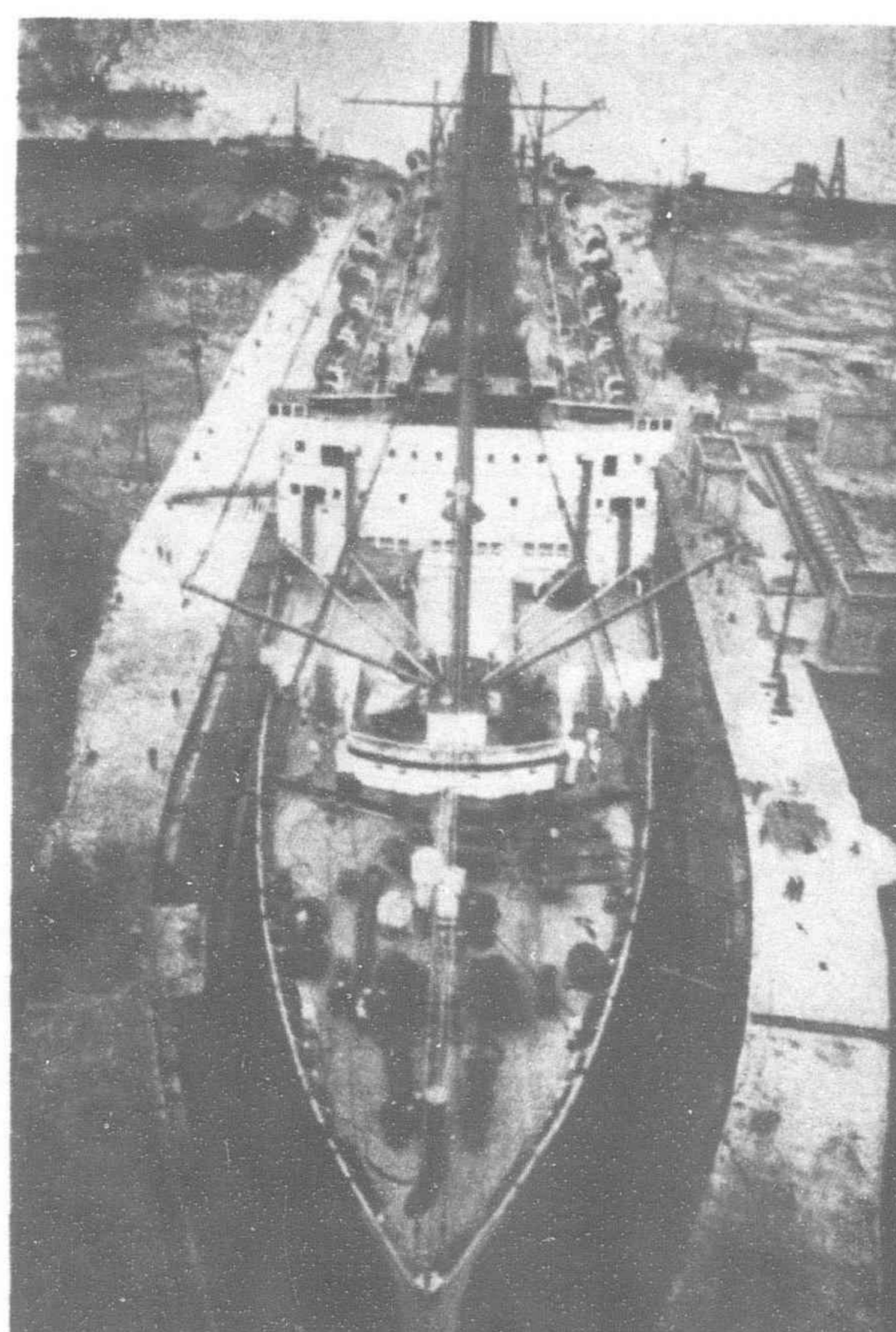
It is worth noting that in Hongkong seven days of "free storage" is allowed in transit sheds, while in most of the ports of the world—including those in Great Britain—the period is from 48 to 72 hours. Shanghai gives 10 days. Singapore seven and Kobe seven. In 1924 the Port Engineer in Hongkong suggested that goods should be removed from transit space within 72 hours in this port.

### Typhoon Troubles

Although Hongkong harbor is well protected from winds of average velocity, special works have been carried out because of the prevalence of typhoons, terrific storms that endanger shipping in the Far East. Typhoons have wind velocities at times exceeding 100 m.p.h. In 1931 a wind velocity of 130 m.p.h. was recorded in Hongkong. A large typhoon affects the weather for nearly 1,000 miles around it, and has an area of about 200 miles, in which winds reach gale force. They come to Hongkong mostly from the East, with some North, or less frequently with some southerly wind influence. It is recorded that 51 out of 60 typhoons were included in directions varying from N.N.E. to S.S.E. and only nine had a Westerly direction; the directions varied from S.S.W. to N.W. With the exception of the typhoon in September, 1906, there is no record of a typhoon blowing from the South. So that any system of docks



Chinese workmen repairing bow damage of S.S. "President Jefferson," in No. 1 Dock, Hongkong and Whampoa Dock Co., Ltd.



"Empress of Japan" in No. 1 Dock, Kowloon Docks

provided needs least protection from a Southerly direction.

There is now an elaborate system of wireless weather signals from ships and stations on the Far Eastern Coast and the Royal Observatory in Hongkong. From the latter signals are frequently sent. So that it can be said that those connected with shipping now have ample warning of gales and typhoons, and are able to take the necessary precautions.

The Marconi, and the cable companies generally, convey all weather messages free of charge. The Royal Observatory appeals to all ships when in wireless communication to send in reports, especially if there are signs of bad weather. In 1919 there were received 61 reports; in 1924 the number was 3,370, and in 1934 it was 6,320.

The effect of a typhoon is to raise the level of the sea, but there is little information to show to what extent the level in the harbor is raised. Rather haphazard observations show that High Water of Extraordinary Spring Tides (H.W.E.S.T.) is 7.70 feet above L.W.O.S.T. In September, 1922, a typhoon passed some 270 miles to the South of Hongkong. At noon, when the predicted tide was 7.7-ft. above L.W.O.S.T., the actual height above datum was 10.05-ft., due to a typhoon 270 miles distant.

It has been suggested that it is better to design transit sheds with precautions against flooding them rather than to build quay walls beyond the level of 14.50-ft. above L.W.O.S.T., the economic height for handling cargo.

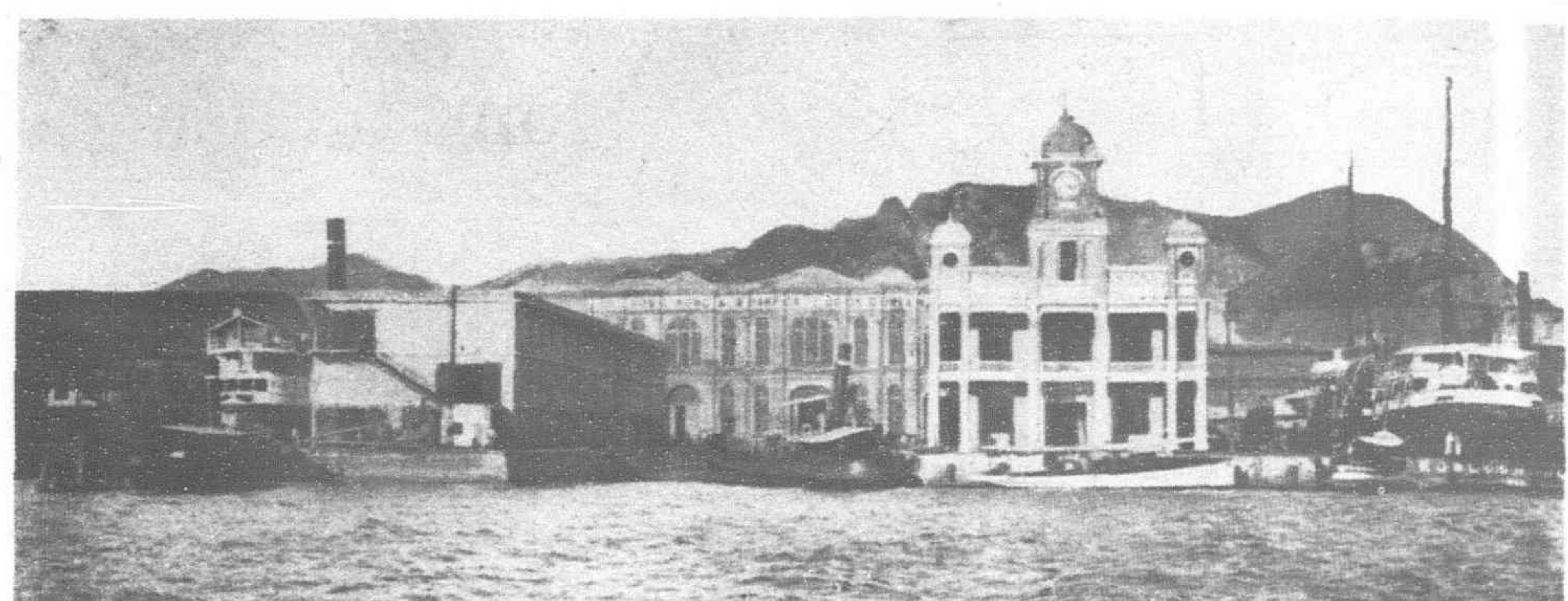
### Typhoon Shelters

All along the S.E. part of the China Coast there are many natural typhoon shelters. On the South side of the island of Hongkong, near the fishing village now called Aberdeen, there is a long inlet which is often crowded with small Chinese craft when a typhoon is expected. It is remarkable that the Chinese fisherman often crowd their craft into this shelter before signals are hoisted; my own observation over 23 years makes me give them full credit for having an uncanny sense of approaching gales.

There are also typhoon shelters in Hongkong harbor, protected by sea-walls and breakwaters in which the launches, sampans (small boats) and other small craft take refuge when the typhoon signals are hoisted.

That at Causeway Bay is on the island side of the harbor. The Causeway Bay typhoon shelter is in a handy position for native craft, as it is easily approached during N.E. gales. It is, however, unfortunately placed, because into it run two nullahs, draining hills and a valley behind it. The heavy rains bring down into these nullahs dirt in suspension which results in a deposit of silt in the shelter.

The most recent typhoon shelter, built on the mainland on the North side of the harbor, was completed in 1915. It took five years to build, cost over two million (silver) dollars, and encloses an area of 165 acres. The breakwater is 3,325-ft. long. It consists of a rubble mound, 192-ft. wide at the base, 20-ft. at the top, and 44-ft. in height. For filling, 850,000 tons of earth were used and also 12,543 concrete blocks, of which 11,397 were pitching and paving blocks, each weighing two tons. The position of this shelter makes it difficult for small craft to beat up against N.E. gales, which must be done to reach it.



Slipways, Stores, No. 3 Dock, General Office and No. 2 Dock, Hongkong and Whampoa Dock Co., Ltd.

During the typhoon season (May to October) these circular storms are liable to travel from the direction of the Philippines along the China Coast. The average number in a year is 16.5. It is no unusual sight in Hongkong to see typhoon warning hoisted at the Observatory. The signals cause small craft to scurry for typhoon shelter; ships in harbor go to allotted typhoon moorings and raise steam; wharves are deserted, houses, shops and offices are shuttered and barred. If the typhoon is near, all cars and buses and ferries cease to ply.

In the 50 years (1884-1933) as many as 73 typhoons approached near enough to Hongkong to cause a gale. The greatest number was five in 1887. The paths of these typhoons vary and are difficult to forecast. They always cause anxiety in shipping circles.

Amongst the great tragedies of Hongkong, are those caused by typhoons. The worst on record was in 1906, when the death roll in the harbor was estimated at 10,000, including the harbor-master, the Bishop, and 13 other Europeans. That typhoon affected Hongkong for 1½ hours. Great steamers dragged moorings and were thrown up on to the shore.

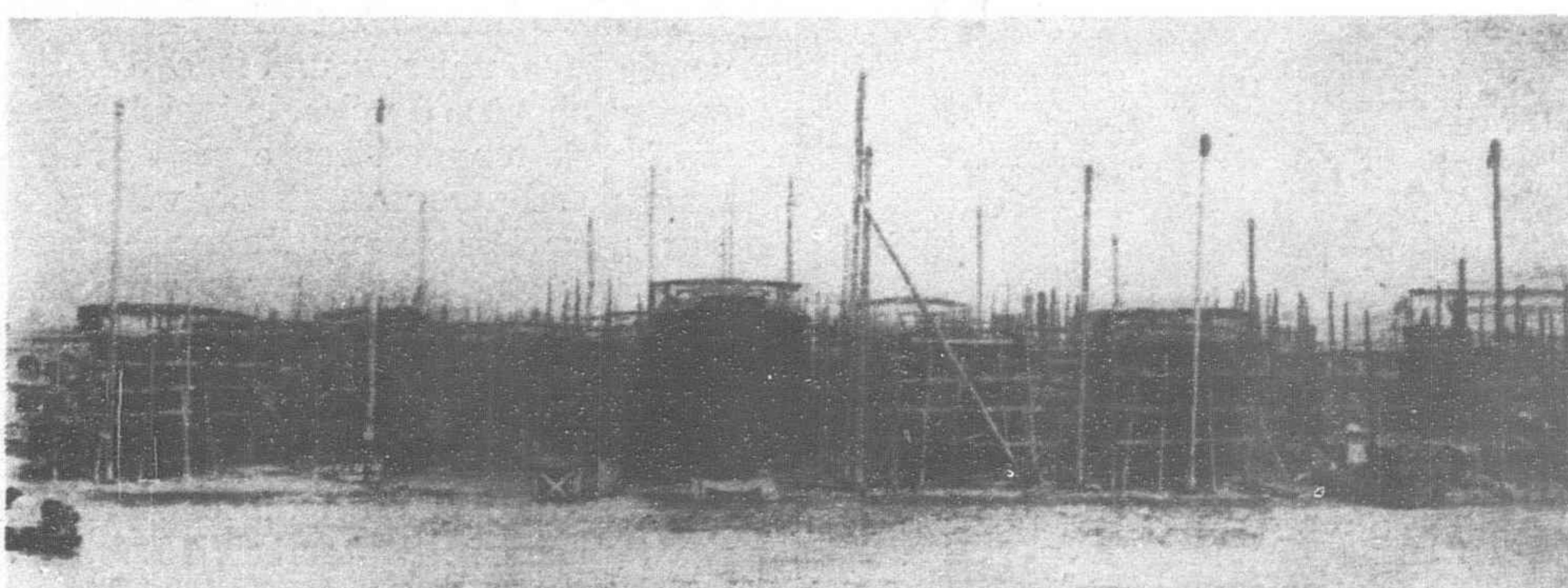
On September 18, at 7 a.m., the barometer started falling, and the lower clouds gave indications of an approaching storm. Local signals were hoisted at 8 a.m., and the typhoon gun was fired at 8.50 a.m., but too late to enable junks, sampans and shipping to find shelter. By 9.30 a.m. winds of nearly 100 m.p.h. were wrecking the shipping, and over 20 large vessels and numerous junks and sampans were destroyed in Hongkong harbor. The local Observatory was bitterly attacked for lack of warning, but a full investigation showed that with the information then available a longer warning was not possible. Nowadays, such a tragedy is almost impossible. In September, 1874, some 2,000 lives were lost and five million dollars worth of damage was done. In the 1923 typhoon many lives were lost. A wind velocity of 130 m.p.h. was recorded.

### Berth Accommodation

Although nowadays large liners calling at Hongkong usually berth alongside a wharf, many of the coasting vessels remain in the stream, loading and unloading into junks. In calm weather there may not be much difference in the time taken to move cargo under either system, but there is no question that there is greater expedition when a vessel is alongside a quay in the typhoon season than if she is at moorings.

That fact no doubt led Sir Maurice Fitzmaurice, and others, to recommend the provision of more berthing accommodation. The whole problem was summarized and brought up to date in an extensive Report made in December, 1924, by Mr. John Duncan, M.I.N.S.C.E.; very little, however, has been done since that date to improve the facilities for berthing, except in lengthening existing piers and by dredging the channels.

At present practically the whole of the water-front (named the Praya) of the City of Victoria, on Hongkong Island, and about 3½ miles long, is one long wharf occupied by junks and barges loading and discharging goods, carried by numerous coolies, through the streets to various godowns of the Chinese.



Eight Steel Vessels under construction in West Yard, Kowloon Docks

(To be continued)

# Diesel Electric Trains for the Ceylon Government Railways

By G. T. SHOOSMITH, M.A.

**I**T is proposed to deal in this article with the railcar field, and to describe briefly the trains now under construction for the Ceylon Government Railways.

In May, 1936, the English Electric Company received an order, through the Crown Agents for the Colonies, for three four-coach articulated Diesel-electric trains for service on the Ceylon Government Railways, on a route of approximately 100 miles between Colombo and Matara. The first section of the route running from Colombo is a thickly populated suburban area with stations at close intervals. The latter section is more thinly populated, and the whole route runs roughly parallel with the sea coast. The area is served by good roads on which considerable private car and bus competition has to be met. As a result of the increased comfort and modern appearance of the new train units, it is hoped to regain much of the traffic that has been lost to the road and, at the same time, to reduce operating costs while increasing revenue.

The new trains will be the first multi-coach, streamlined, lightweight, diesel units of their type yet built in England and will, in appearance and performance, be the equal of any similar units constructed abroad. The design is the result of an exhaustive study of foreign makes of railcars and Diesel train units, including visits by the Company's engineers to many continental railways operating such stock.

The experience gained by the Company with the original Diesel-electric rail coach illustrated in Fig. 1, and which, by the courtesy of the L. M. & S. Railway, was operated on their lines for over two years, has been of paramount importance in the design of the Ceylon trains, both as regards the power equipment and the mechanical parts of the coaches themselves.

The outline and general arrangement of the Ceylon trains are given in Plate I, from which it will be seen that a pleasing streamline effect has been obtained without excessive front overhang. The articulated coaches are connected by bellows, thus preserving the general body-contour and reducing wind resistance. To assist this same purpose the body panels are continued below the floor level in the form of skirtings, which are arranged for easy removal where necessary for attention to the bogies and running gear.

The total seating capacity of each train is 300, and the unladen weight of a complete train unit about 90 tons. The weight of train per passenger carried will, therefore, be 670 lb., and it is interesting to compare this with the average steam-hauled suburban train on British railways, which, including locomotive, weighs in the neighborhood of 1,200 lb. per passenger.

The power units consist of two diesel engine generating sets in each train, one being located at each end; the engines are of the Company's six-cylinder H-type solid injection 4-stroke units,

capable of developing 220 b.h.p. at 1,500 r.p.m. direct coupled to a main and auxiliary generator, the whole unit being flexibly mounted at three points as shown in Fig. 2. This mounting is a special and unique feature developed by the Company and is used on all their traction type diesel engines; it effectively relieves the engine of any stresses which might be set up due to flexing of the locomotive or railcar underframe. The pedestals of the three-point suspension are also insulated from the frame with rubber blocks which prevent vibration being transmitted to the underframe from the engine and *vice versa*.

In actual service these engines will only be called upon to develop 180 b.h.p. at 1,350 r.p.m.; thus a large margin of power is available if required. The engines now under construction, whilst having many improvements embodied in them, remain essentially the same proved and successful units developed and first projected as early as 1928.

The drive is taken through four standard nose-suspended traction motors, two being mounted on the end-bogies of each train. The twin power units adopted have a number of advantages for this class of work. Firstly, should some fault develop in one power unit, it will always be possible for the train to reach its destination on the remaining unit. Secondly, by splitting up the equipment, the weight at either end of the train is reduced, compared with what it would be if all the power equipment were located at one end. On a suburban service requiring complete reversibility, this is an advantage, as the tendency to nose and to tail swing is reduced. An additional advantage is that the weight of the train is evenly distributed, enabling ample adhesion to be obtained on the driving wheels, despite the lightweight construction and without the use of sanding gear. Furthermore, in the layout of the trains it has been found possible to keep the center of gravity of the power equipment well inside the end-bogie king-pins without encroaching unduly on the useful floor space, thus improving the riding qualities of the train.

The control system adopted, consisting of generators with a special characteristic, has been developed by the Company and used on numerous petrol and Diesel-electric traction drives. It combines the features of automatically limiting in a simple manner the load which can be thrown on to the engines with the absence of delicate relays and other apparatus, simplicity being of particular importance on a railway where expert advice is not readily available.

The driver's compartments will be arranged with built-in control desks on which are mounted the various power equipment, speed indicators and time recorders and brake gear indicators, with warning lights, etc., the actual operation of the trains being carried out entirely by two levers, one controlling the direction of travel and

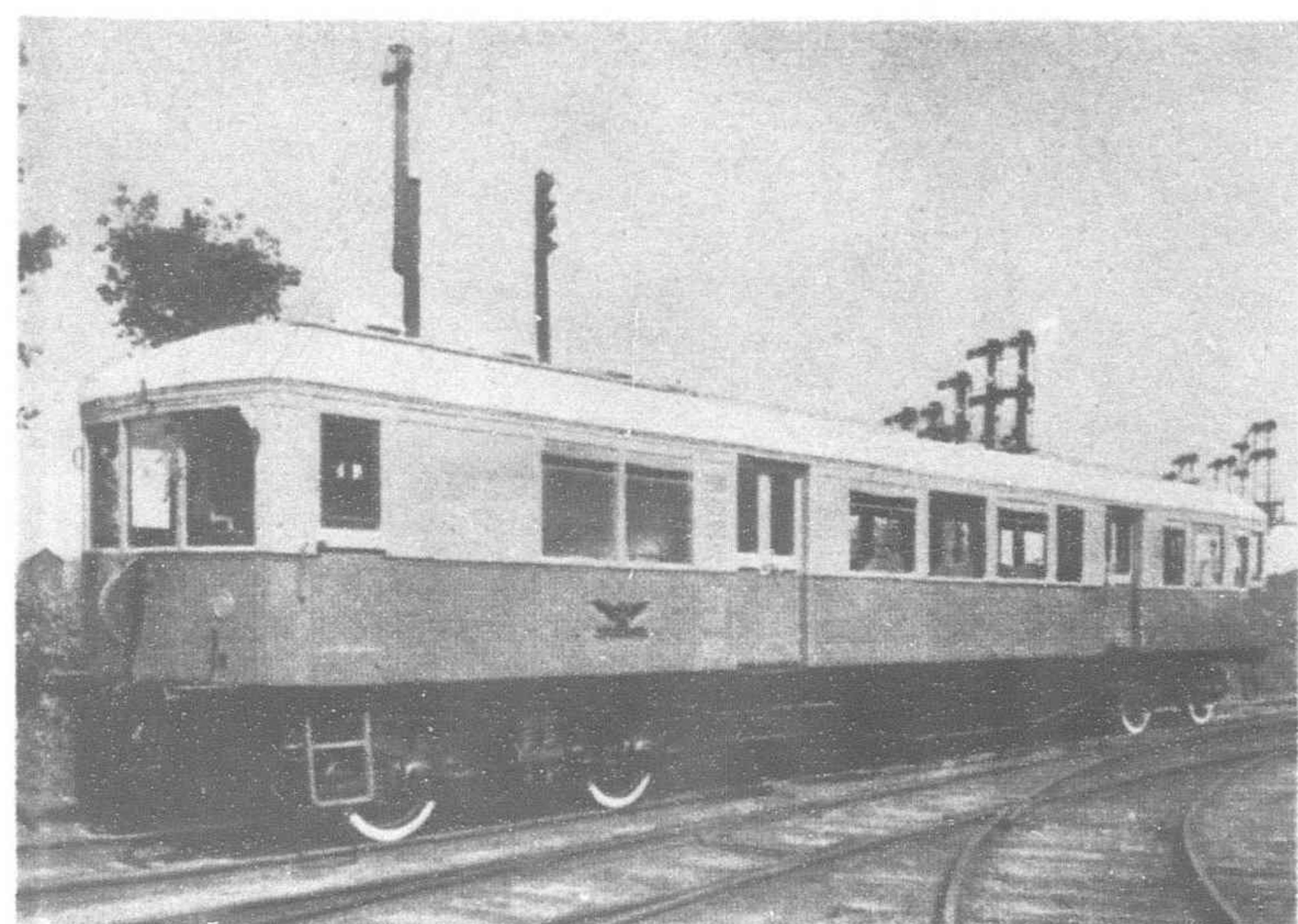


Fig. 1.—200 h.p. "English Electric" Diesel-electric rail coach

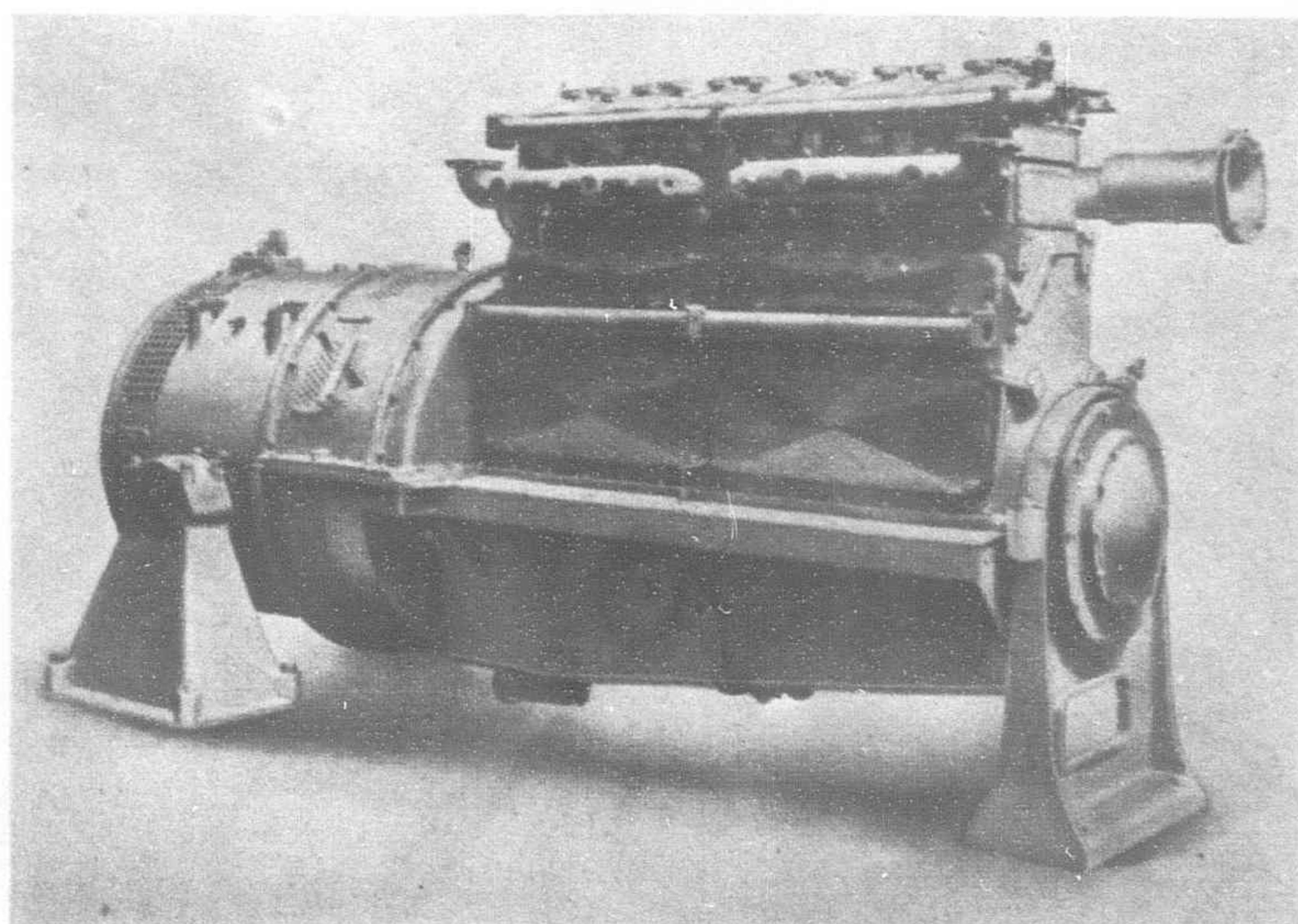
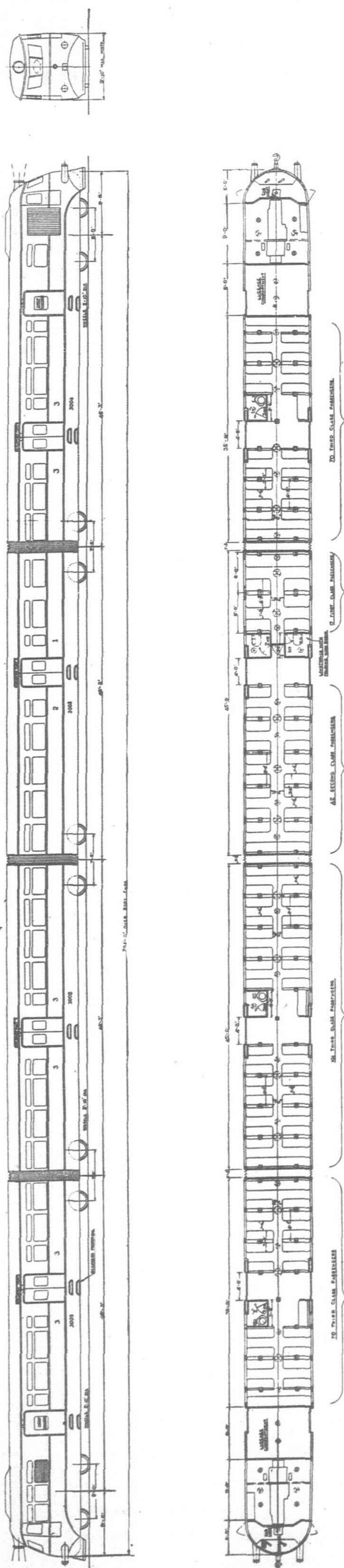


Fig. 2.—Three-point flexible mounting of 220 b.h.p., 1,500 r.p.m. "English Electric" Diesel engine generating set for rail cars



### CEYLON GOVERNMENT RAILWAYS.

GENERAL ARRANGEMENT OF 4-COACH ARTICULATED DIESEL-ELECTRIC TRAIN.

Plate 1.—Sketch showing the general arrangement of four-coach articulated Diesel electric train

the other the speed of the engines and hence the power output. The interior of the driver's cabs will be entirely devoid of the usual untidy runs of cable and piping, all the equipment being located in an accessible position inside the control desk.

The most interesting departure from conventional practice concerns the coaches and underframes. Articulation is now well established both in this country and abroad, the most recent example being the Silver Jubilee trains of the L.N.E.R. Briefly, articulation saves train weight by eliminating, on a four-coach unit, three bogies, and improves riding qualities by making the train operate as one unit instead of as a number of individual coaches.

The underframes of the coaches are of plate girder construction and continuous fore and aft fitted with cantilever brackets carrying the body, which is integral with the underframe, the complete structure being all welded.

The bogies are of all-welded construction, fitted with swing bolsters and clasp-type brakes; the wheels are of the solid disc type to reduce weight.

The body pillars, cantrails, etc., are of special sections formed by rolling and extruding, scientifically designed to combine great strength with light weight.

All body panelling and framework is of copper bearing corrosion resisting steel and the panels and framing are welded throughout. In the development of this form of lightweight construction, a very close study has been made of continental and American designs, and, in addition, the Company has been able to draw largely on its wide experience of all-welded bus and tram bodies.

Some comparative figures may be useful as illustrating the value of this form of construction. The average weight of a British railway passenger coach (8-ft. 6-in. wide) is equivalent to about 1,000 lb. per foot run. The weight of the Ceylon coaches (9-ft. 10-in. wide) will be approximately 500 lb. per foot run. It is not perhaps generally realized that railway engineers are as fully alive to the value of lightweight construction as are modern motor-car manufacturers, but the railways must be of necessity extremely wary of new developments, and it is only during comparatively recent years that the technique of lightweight welded body work has developed sufficiently to warrant its use by the railways.

In the case of the Ceylon coaches, with the exception of the floors and a few internal fillets and mouldings, there will be no wood in the coaches. The interior fittings, lighting, seating, ventilation fans, etc., are all of a thoroughly modern and luxurious type.

The seats in the second and third class compartments are of tubular construction and the cushions of Dunlopillo, while those in the first class compartment are of lightweight alpax framework. It is interesting to note that these will be the first trains in Ceylon with ventilating fans and upholstered seats in the third-class accommodation. The passenger compartments are fitted with balanced lift-up windows and louvres, easily operated by the passengers by means of leverlock catches. Toilet compartments are provided at each end. The vestibule entrance doors are of the double sliding type and central gangways are provided between the seats. All exposed interior metal fittings will be of oxidized brass, and have been specially designed to harmonize with the general scheme of decoration.

A number of twelfth scale models of the end-coach of one of the trains were made and painted in the Ceylon Government Railway colors, and from these a final model has been constructed combining, as far as possible, aesthetic and practical values. Finally, a full-size mock-up was constructed at Preston Works of one coach-end complete with driver's compartment, and from this mock-up the lines, positions of windows and driver's controls, etc., were determined before manufacture was commenced.

The automatic vacuum brakes and running gear generally follow standard railway practice and, so far as possible, embody the standards of the Ceylon Government Railways. One modification, however, which is of interest, is that roller bearing axle boxes are being employed.

In actual operation the trains will be limited to a maximum speed of 45 m.p.h., due to service regulations, but it is anticipated that the units will be capable of 55/60 m.p.h. fully loaded on level track. It may be found in service, due to the light axle loading and smooth drive, that speeds higher than 45 m.p.h. will be permissible. Provision has also been made to enable two complete trains to be run in multiple unit, controlled from one driving

(Continued on page 158)

# The Construction of the Yao Dike on the Han River\*

By T. C. HSI, Director, Kianghan Conservancy Board

URING the early part of 1935 a rainstorm of unusual intensity swept across the provinces of Hunan and Hupeh and across southern Shensi causing enormous floods on the rivers of Hunan Province and on the Yangtze, the Han and the Yellow Rivers. Rainfall for the period July 3 to 8 was reported to be 996 mm. at Ichang on the Yangtze River and for the same period 603 mm. at Chushan on the upper Han River. The total precipitation on the Han River alone, according to computation, was 14 cu.m. of water. This immense downpour resulted in record-breaking floods on both the Yangtze and the Han. On the Yangtze the gage records of river heights at Shasi, Kienli, and Yochow exceeded those of the great flood of 1931. At Siyang on the Han River the river rose to an elevation 4.34 m. above its maximum elevation as recorded in the flood of 1931. As a result the Han River dikes were overtapped in many places and disastrous crevasses occurred. For a period of about two days the discharge down the Han was more than double the river's capacity to convey water. The most vulnerable point on the Han River has long been recognized as at San Sze Kung. The defense work there dates back to the imperial days of the Ming Dynasty. Here the river makes within a few kilometers, a bend of about 180 degrees and to restrain it the government had spent in the past hundreds of thousands of dollars in stone revetment and masonry work. When a dike is overtapped, however, it is usually doomed. The San Sze Kung dike therefore failed and a break as long as 3.6 km. was made through this frail barrier of stone and clay. The river thus made a floodway for itself extending 200 km. downward and hit directly on the Chang Kung dike of Hankow where the water was virtually piled up due to inadequate exits. Havoc and disaster were brought to hundreds of square kilometers of prosperous cities and villages along its path and for several days Hankow was gravely

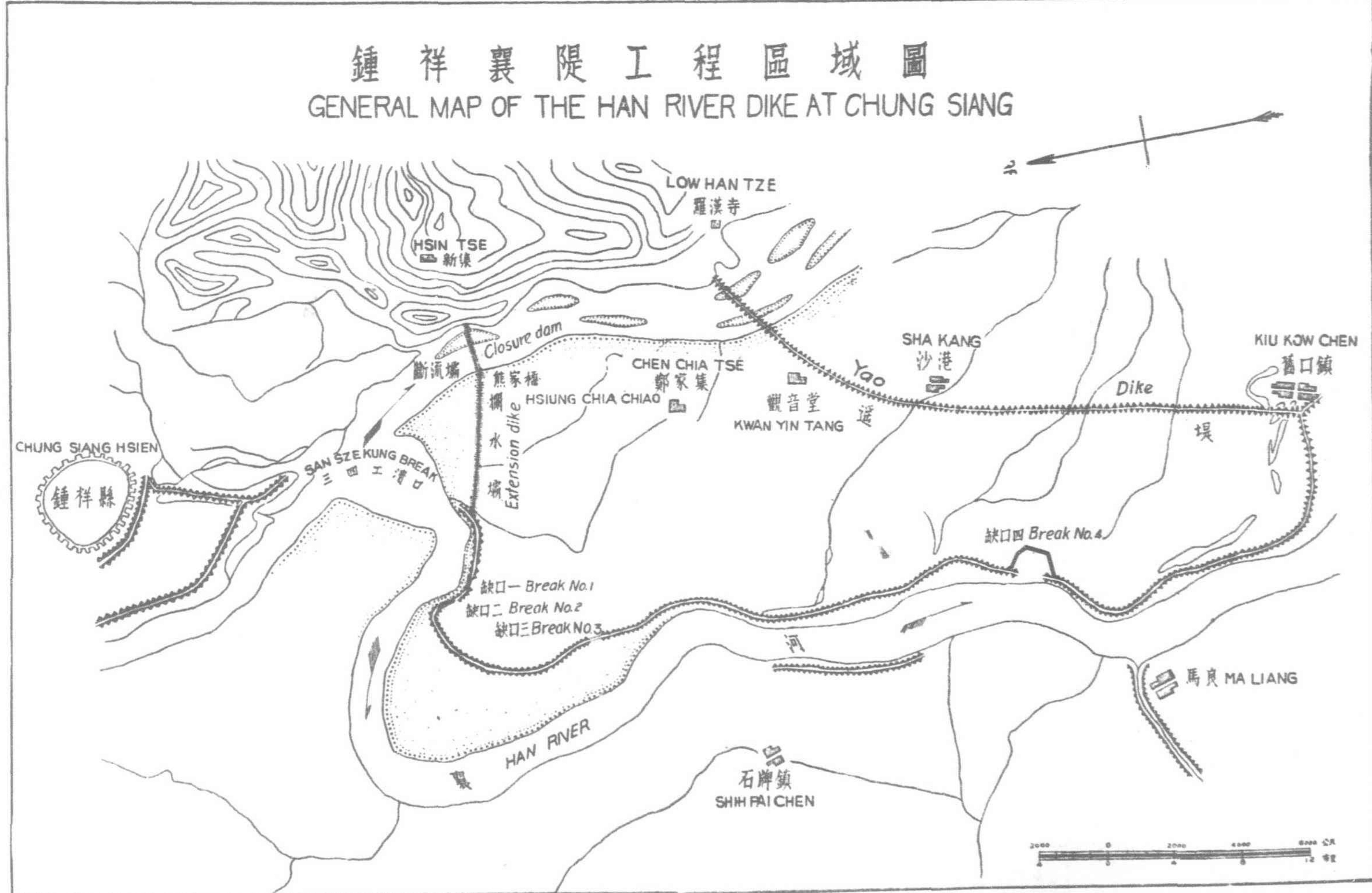
endangered. The seriousness of the situation was quite apparent and it was evident that a permanent plan should be worked out and put into execution as soon as possible. Such a plan, however, would require a comprehensive survey and considerable time before the best plan could be chosen and construction along the adopted lines accomplished in order to enable the Han with its insufficient channel to discharge a flood greater than twice the capacity of the channel. Palliative measures were therefore recommended for the immediate future. After a brief reconnaissance of the afflicted areas, it became evident that such palliative work could be done along any one of three lines: (1) the construction of a cutoff to eliminate the 180 degree bend at San Sze Kung, (2) the restoration of the dikes to their original status along the present location, or (3) the construction of a new dike from Kiukow to Lowhantze behind the old dike, ordinarily known as the Yao Ti (which means literally a "dike at a distance").

These three plans were presented by the Kianghan Conservancy Bureau to a conference of engineers of the National Economic Council and of representatives of the Generalissimo's Headquarters at Wuchang and of the Hupeh Provincial Government, where they were thoroughly discussed. The third plan was adopted, and the writer was placed in charge of the work.

The enormity of the task of building a dike involving nearly 7,000,000 cu.m. of earth and working on a length of 18 km. within the allowable time limit of about 150 days, can easily be imagined (This amount of earth would build a dike 40 cm. square around the earth at the equator). The work of organization for the Yao Ti was immense, and added to the engineering task was the inclement weather of winter when the work was started.

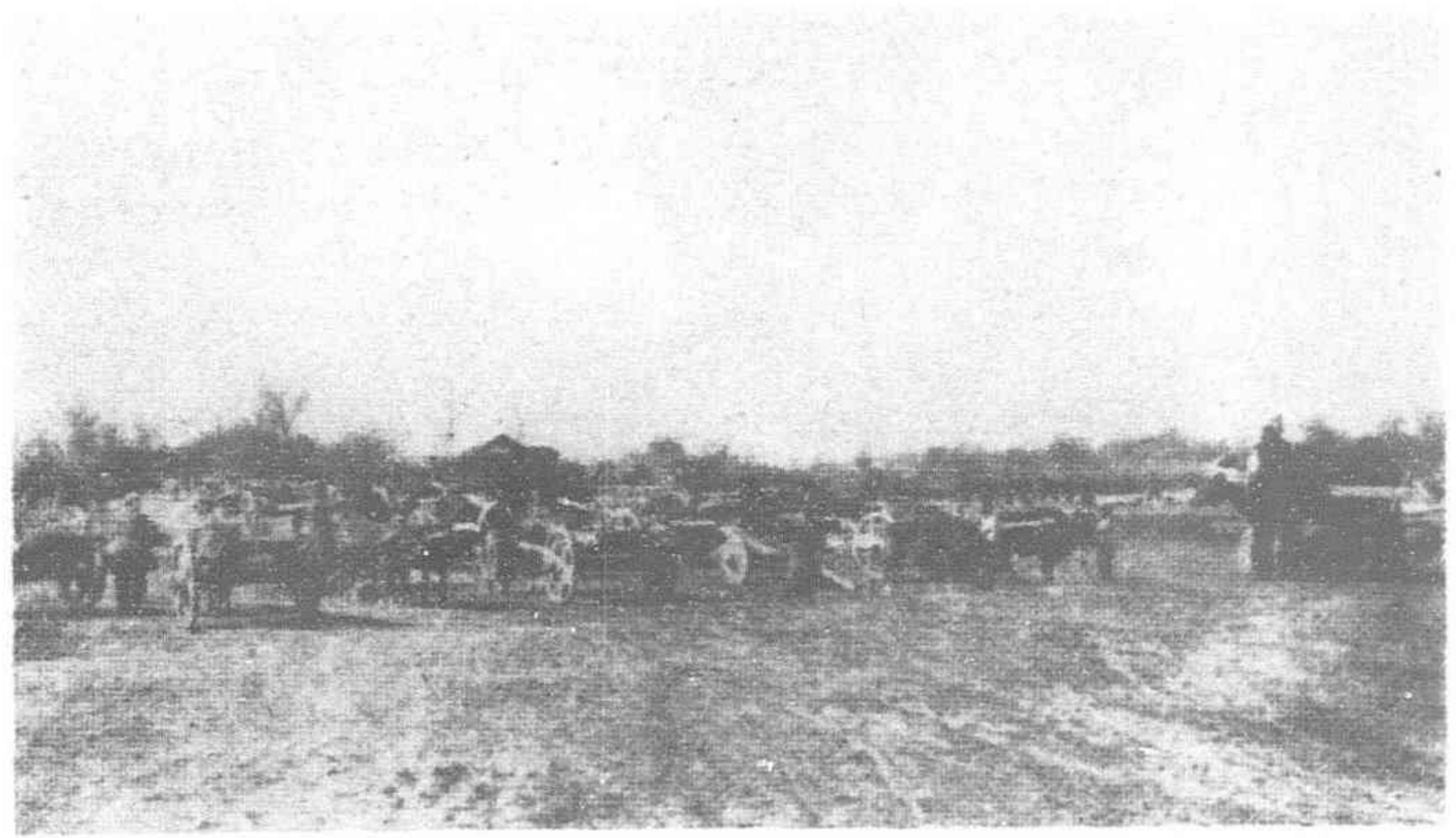
\**Journal of the Association of Chinese and American Engineers.*

鍾祥襄隄工程區域圖  
GENERAL MAP OF THE HAN RIVER DIKE AT CHUNG SIANG





Wheelbarrows, transporting earth for the construction of the Yao Dike

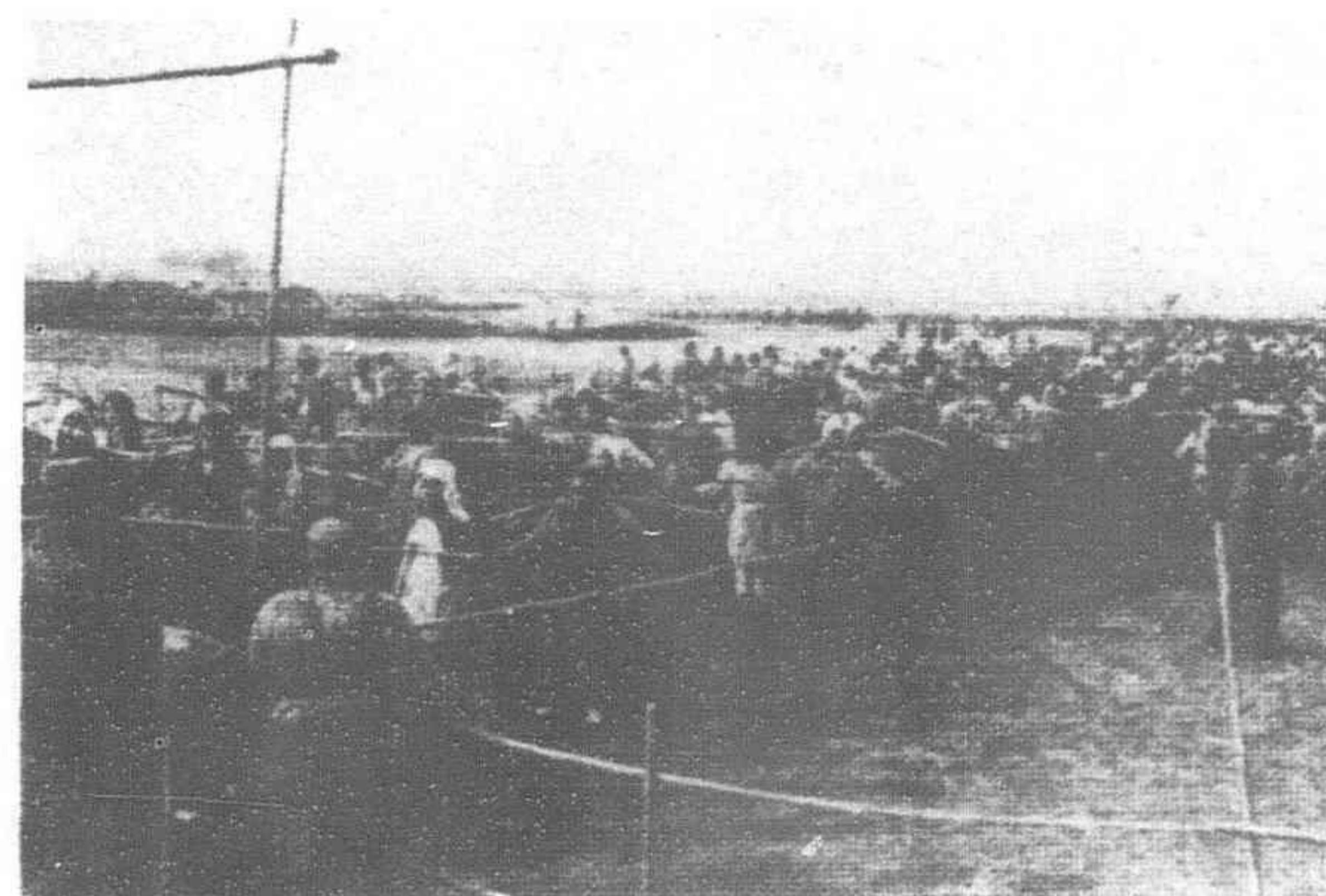


Oxcarts were also used to transport earth

The first task was a survey of the locality in order to choose the best location of the future dike. Much of the country was under water and in the newly developed floodway a new river was flowing. Houses had to be built for offices for the new organization. Huts had to be built for the workmen. Recruiting by means of conscription had to be organized in afflicted districts and at other places scattered over an immense area in Hupeh in order to secure the army of necessary workers. Police and soldiers had to be secured to safeguard the district. A commissary had to be created to supply rice. A purchasing and transportation division had to be developed to secure the materials needed

for the work, and a medical and health department had to be created to look after the health of the thousands of workers. The plan called for: (1) the sealing up of four breaks totalling 7,000 m. in length including the big San Sze Kung break, to an elevation capable of keeping the river from entering the basin until June, (2) the building of a closure dam to divert the flow from the floodway to its regular channel, and (3) the building of the main Yao Ti dike. An estimate of \$2,200,000 was first accepted but later increased to \$2,700,000 by the National Economic Council which provided the finances for the entire work.

The field work was divided into four general engineering divisions of about 4 km. each for the first three units and 2.4 km. for the last unit. The last section was shorter than the others because its location (the crossing of the floodway channel near San Sze Kung) involved greater difficulties. As the dike is 18,000 m. long, extending from Kiukow near the Han River to Lowhantze in the hills on the north-east, the central office of the work was located at Shakong, which is midway along the work. Each of the four subsection offices was thus in easy reach of the central office and was connected thereto by telephone. A transportation and stores office on the river bank, at Ta Hwang Miao, was also a unit under the central office. A new automobile road 16 km. long was



Due to the urgency of construction women laborers were asked to help

built from Kiukow to within 2 km. of Lowhantze, and the old road from Yang Chia Feng to Kiukow was repaired as well. Thus the physical difficulties of the dike work were greatly reduced.

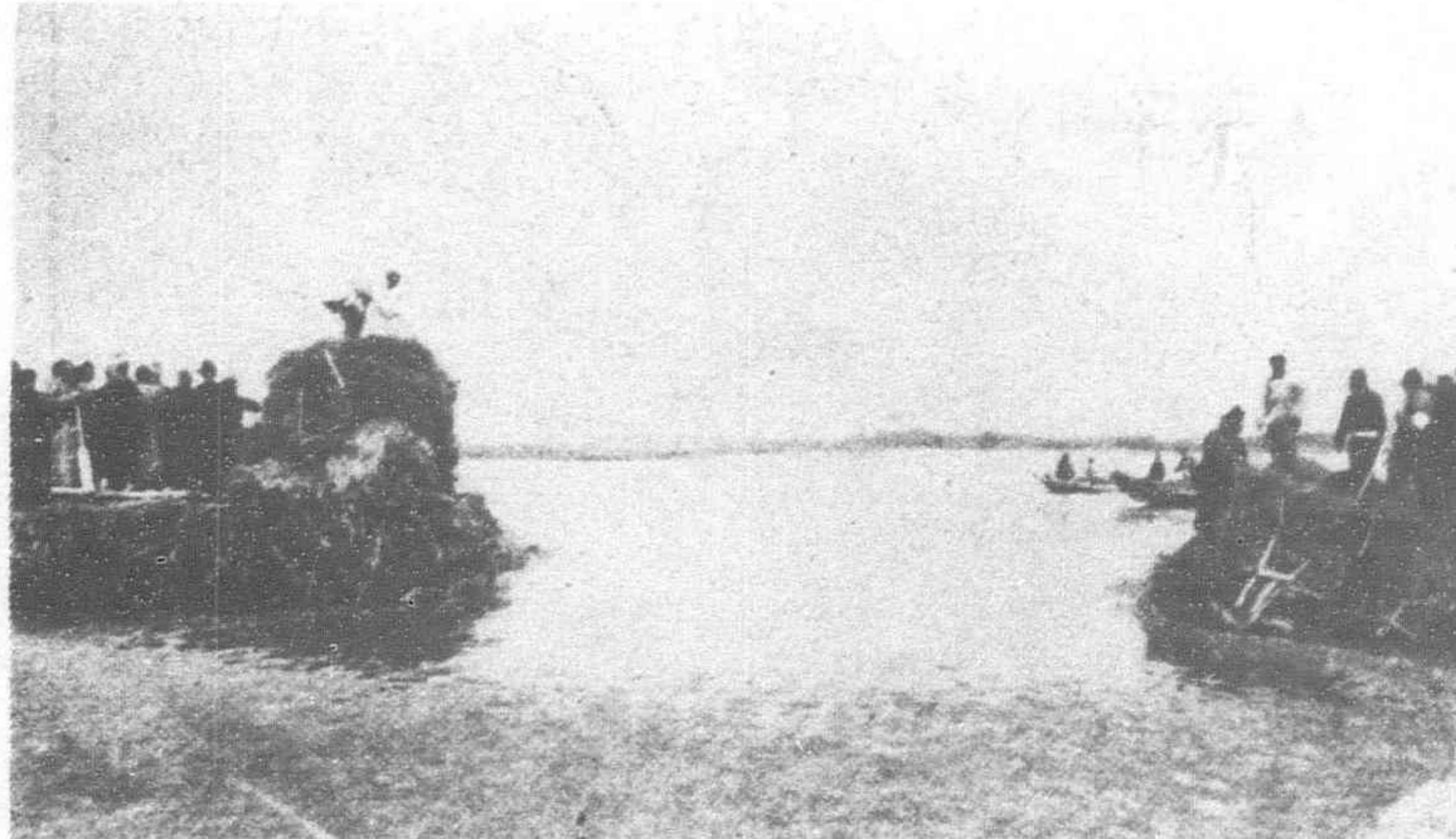
Perhaps the most difficult part of the work was at San Sze Kung, where the river had to be entirely diverted back into its old channel. As long as a big portion of the Han River was allowed to pursue its new course across country, an earthen dike could not be built across the flowing water. It was thus imperative to close the river at San Sze Kung. Several sections were made by sounding across the floodway at many places and as a result Hsiung Chia Chaog was chosen as a suitable location for the purpose.

Extensive preparations in materials and in experienced labor were immediately made and the work was carried out in the depth of winter by the men working day and night for fourteen days. The final closure was effected on February 11. The former river bed in the floodway gradually dried and the work of the fourth section could thus be started.

Beside the San Sze Kung channel which had to be closed, all the other breaks at low water had to be rediked to an elevation to prevent the spring high water expected in May from entering the basin. These breaks totalled 7,000 m. in length and the work of rediking them became in itself a big task. It must be realized that this important work, big as it was, was simply secondary and contributory to the success of building the main Kiukow-Lowhantze dike.

The maximum number of laborers employed on building the main dike was 120,000. To house this vast number 2,400 huts had to be built. These huts were built of bamboo frames and were roofed over with a matting of grass.

The main and subsection office buildings, of which there were seven, were built of wooden framework, were thatched with grass and were sided with bamboo which was plastered over with puddled clay both inside and outside, with a thin final coating of lime mortar

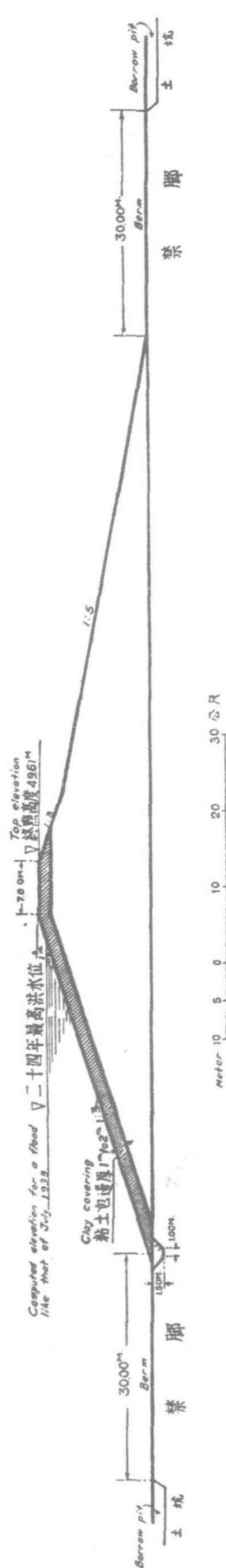


A reed-earth dam was used to stop the flow of water from the break on the Han River



The final closure of the gap in the closing dam was made by sinking a reed-earth slug into the gap

堤 標 準 斷 面 圖  
TYPICAL CROSS SECTION OF YAO DYKE



on the interior. The welfare department organized by the provincial government also constructed many such houses for the recreational use of the laborers.

Prior to the month of May, 1,350,000 *fang* of earthwork were completed on the Kiukow-Lowhantze dike. During the first half of May about 200,000 *fang* additional were completed. Thus on May 15 only 300,000 *fang* of the original estimated total of 1,850,000 *fang* remained to be done. It became increasingly hard to hold the laborers, most of whom were farmers who wanted to return to their land to attend to the coming harvest and to plant the new rice crop. To replenish this gradual shortage, the Kianghan Conservancy Bureau recruited about 4,000 laborers from the vicinity of Hankow and about 2,000 from Kaifeng, Honan. It was expected, however, that the work of the first three subsections could be finished by the end of May and that of the fourth section by the middle of June, well before the advent of the high-water season.

The original program had been to complete all work on the Yao Ti by April 30. The closing work at Hsiung Chia Chao had accordingly been built of such height and section as to resist all floods likely to occur on the Han River before that date. On account of the deficiency of laborers the work on the main Yao Ti could not be finished according to schedule, and it therefore became necessary to heighten and strengthen the 7,000 m. of closing works to an elevation of 45.0 m. and to surmount the crest of the closing dam with a "baby" dike 1 m. high

up to elevation 46.0 m. However, on May 26 a flood, tremendous for the Han for May (the previous greatest recorded height at Siangyang being 1.5 m. lower than that of May 1936) swept down upon the new works and surmounted at elevation 45.3 m.

the top of the main closing dam. The newly built "baby" dike proved insufficient, the closing dike was breached, and a gap 530 m. wide was washed out of the Yao Ti where it crosses the former river channel.

Again work on closing the gap was done as rapidly as possible. The breach had been narrowed to only 15 m. by July 4 but at that time a second flood widened it to 125 m.

At a conference of the officials of the National Economic Council, the Hupeh Government and the Kianghan Conservancy Bureau it was decided not to close the small gap of 125 m. until autumn when danger of further flood will be passed. The amount of water that has thus far passed the small remaining gap can easily be handled by the Tienmen River into which it flows; and besides, this additional water has proved, according to report, beneficial for irrigating purposes in the Tienmen Valley. Of the 18 km. of the Yao Ti, involving nearly 7,000,000 cu.m. of earthwork, practically all is now done except the present gap of 125 m. and a little heightening and strengthening work in the fourth section.

## Fair and Warmer

(Continued from page 129)

Japan's national existence and growth. Japan, on her part, must fully understand China's unification movement and the expanding strength of the Central Government. Furthermore, Japan must make a thorough study of the real nature of the National Government and the development of its various branches. Unless Japan constantly keeps in mind the nature of China's national unification there is no hope for a readjustment of Sino-Japanese relations."

With reference to China's reported rapprochement with Russia and other reports regarding British participation in co-operative activities in China, the Japanese Ambassador expressed the belief that the whole so-called China question revolves around international relations pertaining to China.

"It is only natural," he explained, "that in considering relations between Japan and China the trends shown by third parties should be borne in mind. There is no difference between Japan and China in this respect."

Specifically, about questions of Anglo-Japanese co-operation in China, the Ambassador said he had not observed any particular leaning in that direction in British official circles in Nanking. The nature of Japanese proposals to be put forward when diplomatic discussions with China are re-opened probably will not be formulated until after the Ambassador makes his report in Tokyo, and the date when the Ambassador will return to China has not yet been fixed.

In all likelihood the diplomatic discussions in China with Japan will not take place before the middle of June. Early in April Generalissimo Chiang Kai-shek went to his native home in Fenghua, to be present with his family at the funeral of his brother, Chiang Hsi-hou, which was attended by a large number of high Chinese Government officials. The return to Chekiang of Chiang Kai-shek was made the occasion of a rather important conference of Chinese military and civilian leaders. Some significance was attached by the press in both China and Japan to the political discussions that took place at this conference, and, according to a Japanese newspaper report, a major purpose of the gathering was to formulate measures to resist Japanese activities in China. Following this meeting it was announced that Chiang Kai-shek would be absent from his post in Nanking for two months. It is not likely that the diplomatic exchanges with Japan would be opened in his absence from the Capital, and Dr. Wang Chung-hui, acting President of the Executive Yuan while the Generalissimo is away, announced definitely that through the two months while he is in charge of the Executive Yuan no changes in its administrative policies will be made.

About the future outlook for China both Chinese and Japanese leaders have been speaking with uncommon clarity and frankness, and, while complete unanimity of viewpoint is not to be found either in Japan or in China, it is clearly apparent that opinions of the leaders in both countries run along parallel lines. It is an accepted rule that "things equal to the same thing are equal to each other." So, with some measure of hopefulness, the forecast for the Far East at this time may be written—Fair and Warmer.

# Rubber in Mining and Other Machinery

**I**T is not generally realized that rubber is an extremely durable substance so long as certain simple conditions are fulfilled and one of the most important of these is that it should be in a constant state of tension.

Fortunately this fact is of great assistance from a mechanical point of view and it has made possible a new form of bush which has distinctly desirable qualities where the presence of grit and water would quickly tend to deteriorate metal to metal surfaces in frictional contact.

It is for this reason that a new bush known as the Silentbloc and which relies upon rubber for its flexibility, is of special interest to those who are concerned with the construction and maintenance of both mine and quarry equipment.

The fundamental principle upon which the success of this device depends, is that of stretching a section of rubber evenly between two concentric steel tubes so that all are firmly held. It should be made clear that this form of bearing is not intended for continuous rotary motion, but when the metal tubes are gripped the rubber insert permits of a turning motion to an extent varying from 20 degrees to 40 degrees each side of the neutral axis, the actual figure being dependent upon the number of oscillations per minute and the load carried. The movement is entirely due to the flexibility of the rubber and at no point is there any surface friction.

For some time past these bushes have been used on coal screens and shakers calling for reciprocating movement and the primary object for using rubber was to overcome the relatively rapid wear of metal to metal bearings, due to the ingress of grit and water, in some cases both.

In the case of one screen the capacity is 40 tons to 50 tons per hour, whilst the eccentric shaft speed is 380 r.p.m. The driving member and each link was rubber bushed in the manner described, each bearing carrying an approximate load of 1,000 lbs. per bearing. The deviation in reciprocal angularity amounts roughly to three degrees in all cases.

In regard to the shaker the load is only about 200 lbs. per bearing which allows an increase in the angular movement.

A very wide range of standard sizes is obtainable and it is of interest to record that after several years of constant service one of these bushes was cut in two and the rubber was found to be in a condition equal to new, for apart from the desirability of tension already mentioned light cannot penetrate to the rubber when it is in position and this is an additional advantage.

The makers of this bush who are Silentbloc Ltd., Victoria Gardens, London W11, have utilized the same principle for anti-vibration mountings upon which machinery of all kinds can be supported and any vibration which may be developed cannot be transmitted except to a very minor extent.

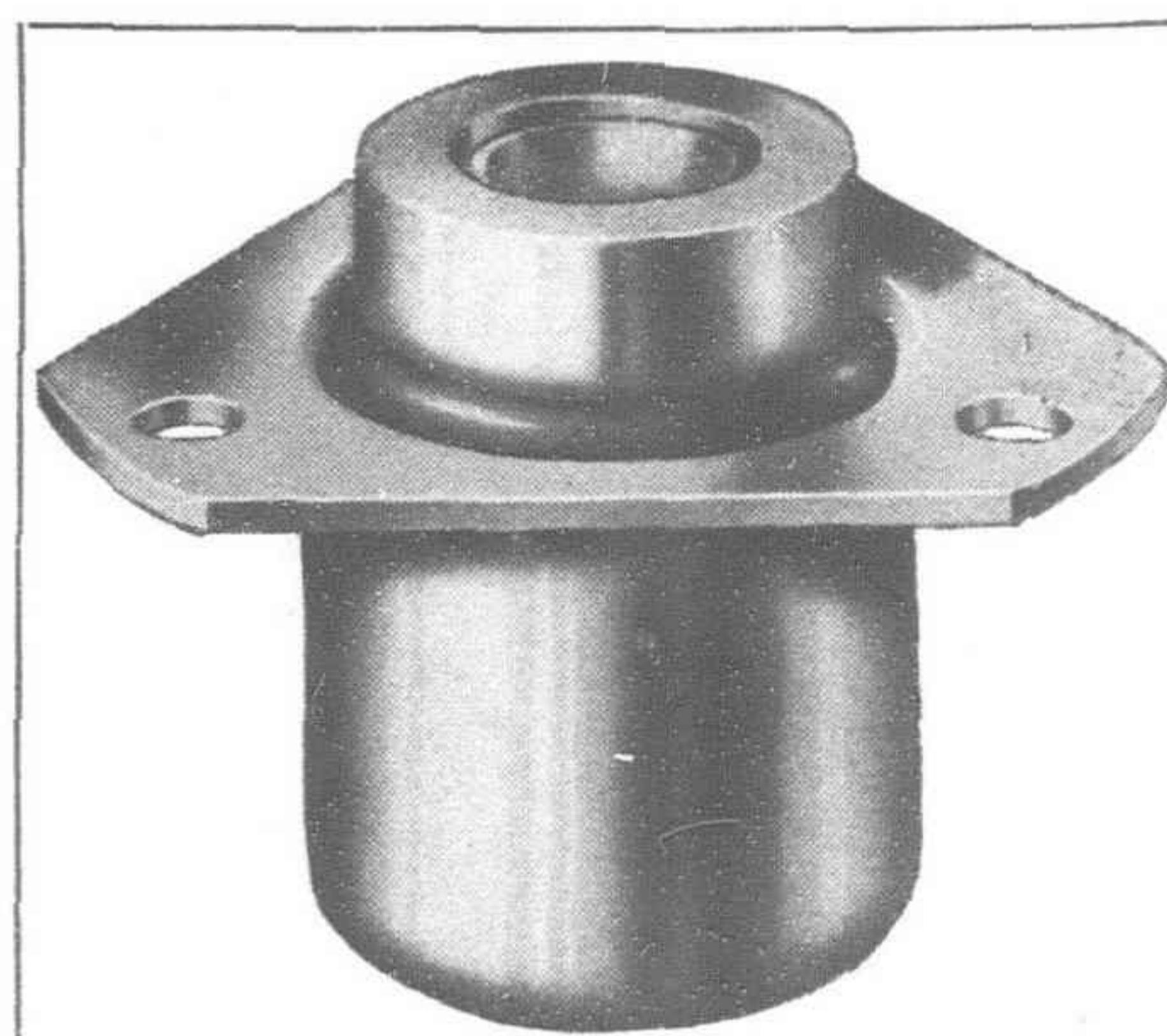
The efficacy of these mountings is evident from the vibrograph charts which have been taken from time to time. In cases of this kind rubber inserts of the ordinary type are useless because they perish due to their not being in tension, whilst an even more serious drawback is the spreading which takes place, moreover there is metal to metal contact through the holding down bolts and which would need to be tightened from time to time.

The concentric tubes of these mountings are carried vertically and provided with suitable flanges so that the load may be supported on the inner or outer tube as may be desired. The load which may be supported is surprising considering the relatively small size of the mounting and although four units are generally fitted, single mountings have already been supplied each of which is capable of sustaining a load of eight tons.

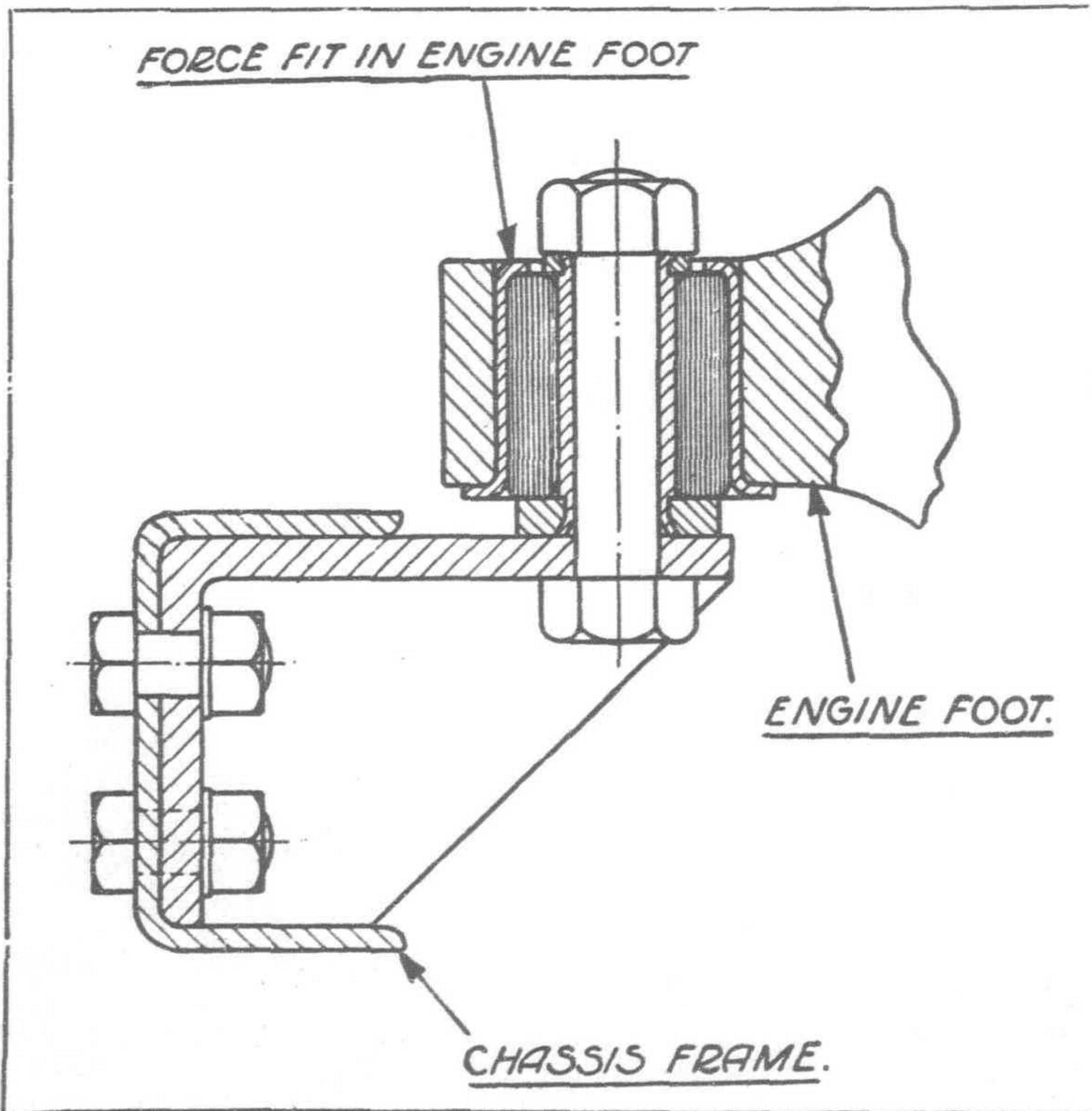
Another application which is of direct interest to machinery users who are concerned with the question of wear relates to a flexible coupling in which there is no metal to metal surface in frictional contact, moreover this type of coupling overcomes both angular and parallel misalignment.

The design is extremely simple the coupling relying upon four resilient rubber trunion blocks set 90 degrees part and connected

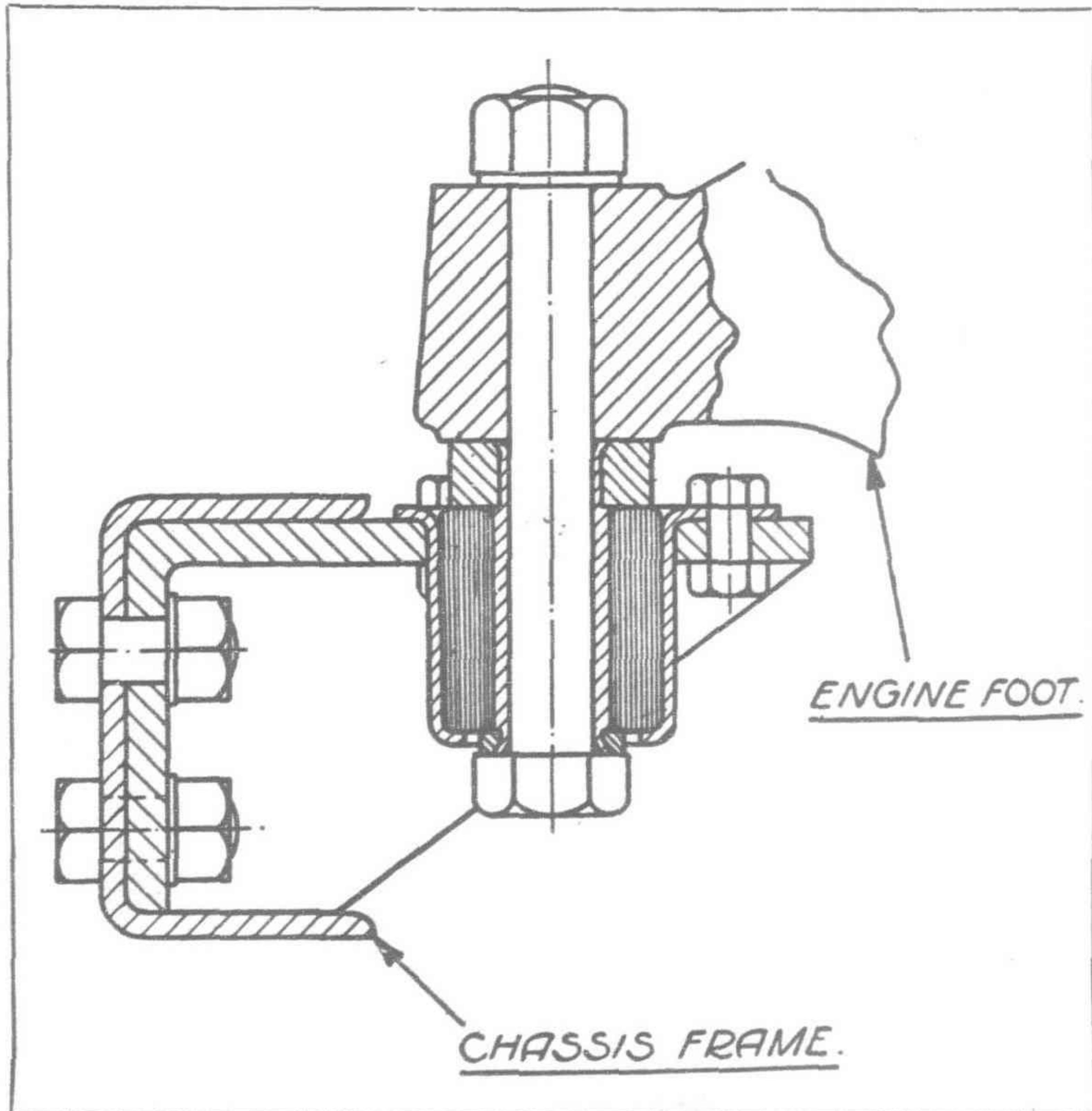
(Continued on page 166)



Silentbloc Anti-Vibration Mounting



Method for Anchoring an Engine to the Chassis of a Car



Typical Application to Motor-car Engine Feet

# Combined Manœuvres at Singapore\*

COMBINED operations, with the object of testing the various defences of the Port of Singapore, were held on February 1, 2 and 3. The operations were comprehensive, and were designed to exercise all units of the Navy, Army and Air Force in the defence of Singapore. Royal Air Force units concerned are No. 36 (Torpedo Bomber) Squadron, No. 100 (Torpedo Bomber) Squadron, No. 205 (Flying Boat) Squadron and No. 230 (Flying Boat) Squadron, all from Singapore; No. 27 (Bomber) Squadron and No. 11 (Bomber) Squadron from India; No. 203 (Flying Boat) Squadron and No. 84 (Bomber) Squadron from Iraq; and one flight of the Singapore Auxiliary Air Force Squadron. Aircraft from H.M.S. *Hermes* are also taking part and the squadrons from India and Iraq are accompanied by bomber-transport machines with spares and supplies.

The Royal Air Force units other than those embarked in H.M.S. *Hermes* are under the command of Air Commodore A. W. Tedder, Air Officer Commanding, R.A.F. Far East Command.

The attacking Force consisted of two cruisers, five destroyers, submarines and a submarine depot ship, the aircraft-carrier *Hermes* with a simulated total striking force of over 100 aeroplanes, and a detachment of the Johore Military Forces.

The defending Force consisted of the Regular Garrison at Singapore, eight squadrons of the Royal Air Force with their attendant Bomber Transport machines, and a flight of the Singapore Auxiliary Air Force Squadron, four destroyers, four submarines with a submarine base ship, and detachments of the Straits Settlements R.N.V.R.

The general idea of the Exercise was that an imaginary independent State (Blue Land), situated about 1,200 miles Southeast of Singapore (Red Land), has a small but efficient fleet, including a fleet air arm and a small army equipped on modern lines.

Blue Land and Red Land have always lived on terms of friendship with one another, but on January 6, the Malaya Command Headquarters received intelligence (which was not then regarded as reliable) that Blue Land had resolved to attempt an attack on Red Land with the object of capturing the island.

On January 12, reliable information was received that an expedition consisting of warships, transport and aircraft-carriers was being prepared by Blue Land and was expected to sail about the end of January.

By February 1, the expedition had sailed.

The weather on the night of January 31, was generally fine, with good visibility, but for a few local storms south-west of the area of the operations. Royal Air Force patrols were sent out before dawn, but no Blue Land ships were located until 07.00 hours, when flying-boats on daylight patrol reported that two enemy destroyers were 180 miles eastward and south-eastward respectively of Singapore.

During the early morning a small military operation took place in the Changi area in connection with the defence of that part of the fortress. The Johore military forces were assumed to have made a surprise landing during the night, and their attack met with some measure of success.

Throughout the day aeroplanes and flying-boats kept up a constant search for the enemy fleet, but although reports of movements were brought back, no units were sighted from the shore before nightfall.

On the following day visibility was about 20 miles at sea and about 10 miles inland, and in the early afternoon there were heavy showers in the neighborhood of Singapore. Royal Air Force patrols went out throughout the day, and night patrols from 19.00 hours.

Between 16.00 and 20.00 hours three enemy destroyers were reported heading indefinitely for the Straits, and at 16.00 hours submarines were sighted east of Singapore, but dived immediately. Three-quarters of an hour later four destroyers were observed 90 miles east of Singapore, heading westward. Later in the day Naval patrol vessels reported enemy destroyers approaching from the south-east at an estimated speed of 20 knots.

In the early morning a flying boat of No. 205 (F.B.) Squadron crashed while taking off from the Straits of Johore, and although five members of the crew were saved, the second pilot, Flg. Off. R. D. Blair, was killed. His body was recovered.

During the night of February 2-3 the Red Land Naval patrols and coastal defences were actively engaged in beating off attempts by Blue Land destroyers to test the defences. The eastern entrance of Keppel Harbor was attacked, and attempts were made by the invading destroyers to land forces. They were driven off with heavy losses.

The Red Land air forces spent a comparatively quiet night, as the Commander-in-Chief had decided to conserve his air forces because at that time the main Blue forces were still unlocated. Regular air patrols were, however, maintained throughout the night.

At 08.00 hours on February 3, a Blue Land aircraft-carrier, accompanied by two destroyers, was seen about 260 miles N.67E of Singapore, and at 07.45 hours a cruiser was reported 200 miles N.67E of Singapore.

At 11.40 hours a heavy attack by Red Land was launched against the aircraft-carrier. The attack was actually delivered at 13.00 hours, before the carrier had time to launch her machines. A second attack was made on the carrier at about 14.00 hours, again before the machines on board could be flown off.

Nine aeroplanes were on deck at the time. These took off and followed the Red Land bombers and torpedo bombers back to Singapore, where they attacked the aerodrome at Seletar and shot up the defending machines while they were landing.

During the evening H.M.S. *Medway*, representing transports, escorted by destroyers, was sighted 150 miles N.E. of Singapore, and at 18.00 hours a cruiser accompanied by three destroyers was seen about 50 miles east of Singapore.

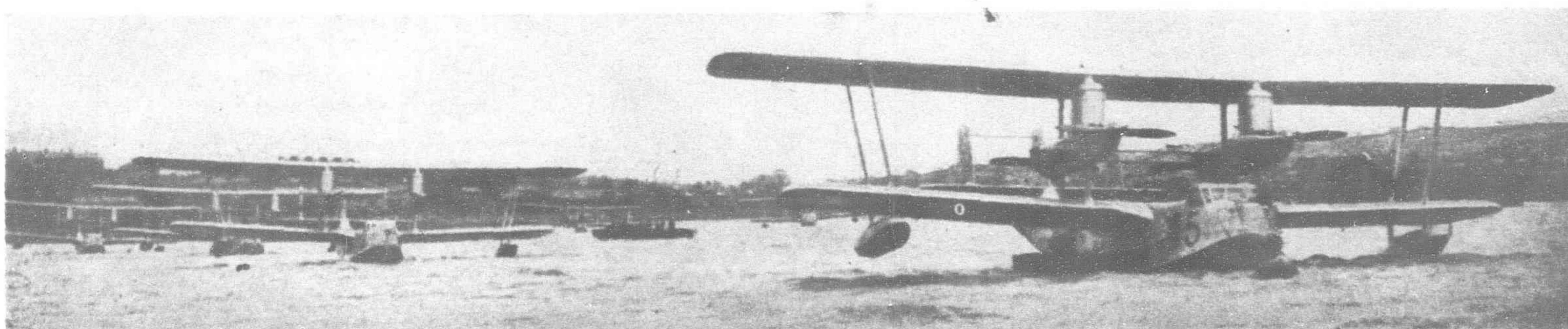
By nightfall the Blue Land fleet was converging on Singapore from three directions, preceded by aircraft from the aircraft-carrier. Troops were landed in Southern Singapore during the night from cruisers and destroyers, but although they gained a foothold on the beaches to the east of the city and on Blakangmati Island, they were unable to hold the positions and were driven off with great losses.

Because of the fine weather the Blue Fleet were not able to evade the Red patrols, and the Blue transports and their escorting destroyers were stopped in Singapore Strait by continuous attacks from the air and by submarines.

When the enemy cruisers withdrew they used smoke screens.

The exercises ended on the night of February 3.

\* *The Aeroplane.*



Aeroplane Photo

The Singapore Exercises—No. 230 (flying boat) squadron, R.A.F., one of the units which took part in the Singapore Manœuvres. In the photograph the squadron is leaving Pembroke Dock to fly to Singapore

# Empire Flying Boats for Far East and Transatlantic Service

THE twenty-eight Empire flying boats to the order of Imperial Airways, of which the first few are completed and the remainder under construction by Messrs. Short Bros. at Rochester, present to the world an entirely new conception of what can be achieved in rapid, comfortable, and secure air travel. They are among the first of the real Air Liners, providing sleeping accommodation for passengers, capable of covering long distances non-stop, and equipped for accurate navigation in any quarter of the globe. Twenty-four passengers with their luggage,  $3\frac{1}{2}$  tons of mail, the necessary crew, and fuel and oil for a range of 800 miles (1,270 kms.) can be carried. The estimated speed of these boats was 150 m.p.h. (241 km./hr.) for cruising, with a maximum speed in the neighborhood of 200 m.p.h. (322 km./hr.). The trials show that the former speed has been exceeded, a cruising speed of more than 160 m.p.h. (257 km./hr.) having been reached with less than the guaranteed engine horsepower and consumption. A number of the boats will be fitted with extra large fuel and oil tanks, enabling them to cover a range well in excess of 2,000 miles (3,220 kms.). These will be used on the long sea crossings entailed by many of the extended routes to all quarters of the British Empire.

The first boat to be completed, the *Canopus*, was launched in July last and at once successfully completed the preliminary trials which Messrs. Short Bros. made on the water and in the air. Shortly afterwards, the Imperial Airways' pilots carried out the acceptance trials, which were completed with every satisfaction. The nature of these tests and the excellent results obtained may be gathered from the following extracts included in a report on them.

"The *Canopus* made its first flight in July, 1936, and behaved well. It has since been flown with every variety of loading

except the full overload. It has handled well in the air and on the water. It has been tried with every possible engine combination and has even proved easy to control with two of the four engines stopped on the same side. . . . From the trials of the past week the makers believe that the performance of this class will fulfil all expectations."

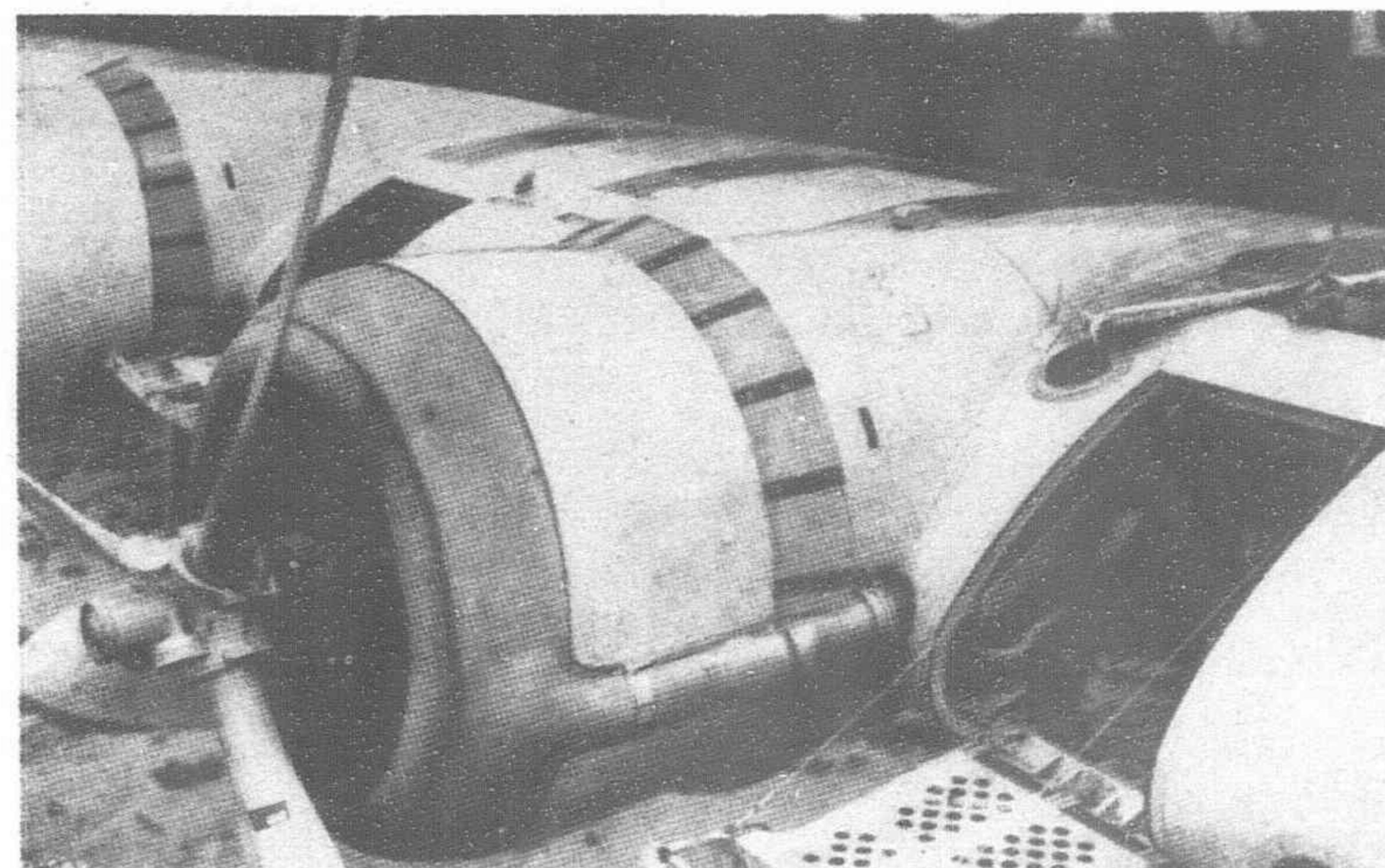
The second boat of the fleet, named the *Caledonia*, was launched on September 9 last, and after the usual constructors' trials was sent to Felixstowe, the Marine Aircraft Experimental Station of the Royal Air Force, for official type trials prior to the grant of an airworthiness certificate to this new design and class of aircraft.

The results of these official trials have exceeded expectations.

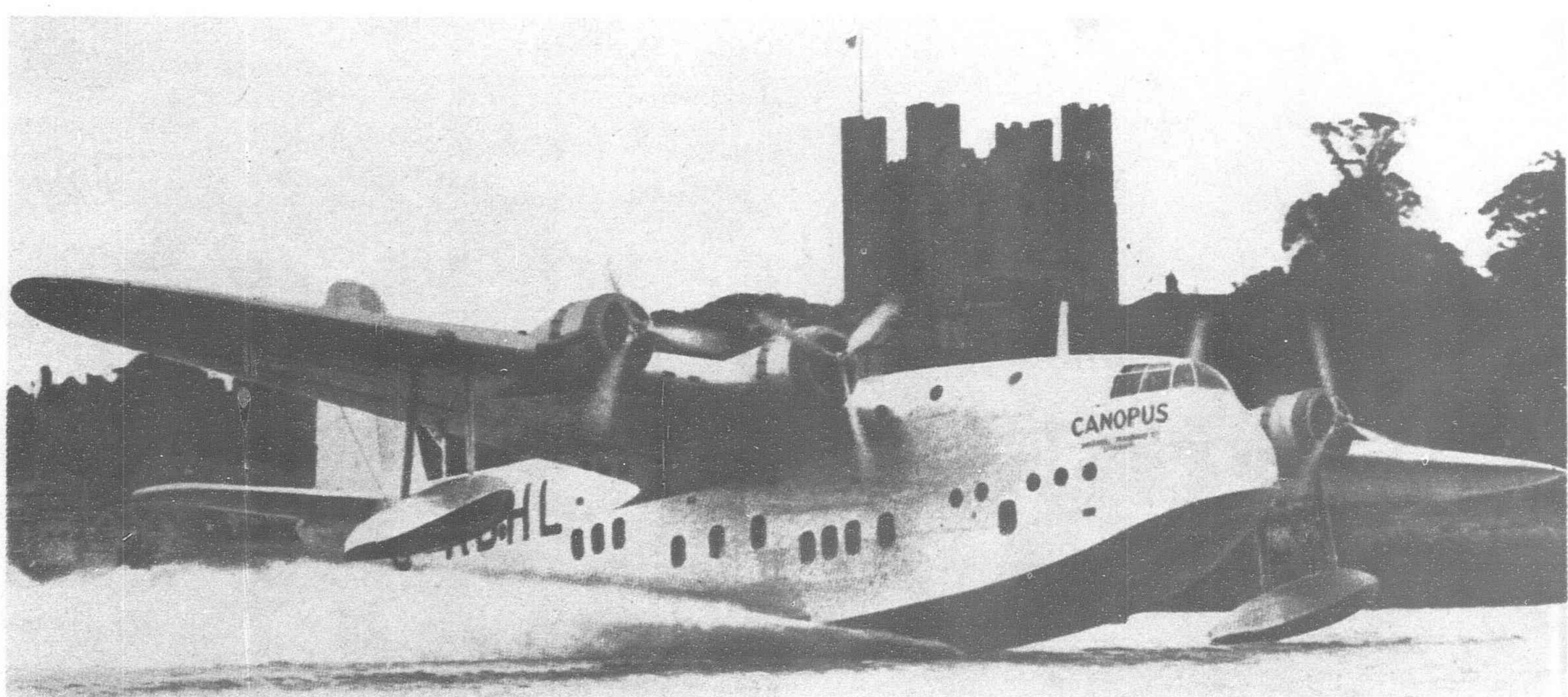
The success of these first two machines is the culmination of a long period of development work which has been spent on the evolution of the aircraft and engines, and is a striking vindication of the courage and foresight which Imperial Airways showed when they placed the order for so colossal an undertaking and to the confidence they must have had in the builders of the Empire boats and the "Bristol" Pegasus engines with which the machines are equipped. The order was given for the whole fleet of twenty-eight flying boats as soon as the design stage of the aircraft had been completed.

These boats, of which the first four have now been launched, will replace the Imperial Airways machines at present in use on the Empire routes. The remaining boats are following at the rate of one every three or four weeks. In the meantime the duties of the first half-dozen have already been allotted to them.

*Canopus*.—As soon as acceptance and airworthiness trials were completed, this boat was placed upon permanent Mediterranean service on the route to Africa and the East. The first regular service flight was made on October 30 last.



One of the Engine Nacelles of the Empire Boat showing neat inspection manholes in the wing, the covers of which serve as convenient platforms for engine servicing



The Short Empire Boat "Canopus," taking off on her maiden flight with the Eleventh Century Norman Structure of Rochester Castle in the background

*Caledonia* has been fitted with long range fuel tanks and is scheduled for lengthy flights in preparation for the forthcoming transatlantic service. One of her early trial trips will probably be a non-stop flight of some 2,500 miles (4,025 kms.) around the coastline of Great Britain.

*Cavalier* is destined for the New York-Bermuda service, which is to be inaugurated conjointly by Imperial Airways and Pan-American Airways before the end of the present year. Some 800 miles (1,270 kms.) of sea lies between these two points, and since the normal range of the new boats with full pay load is about the same distance, extra fuel tanks will be installed to provide the safe margin required.

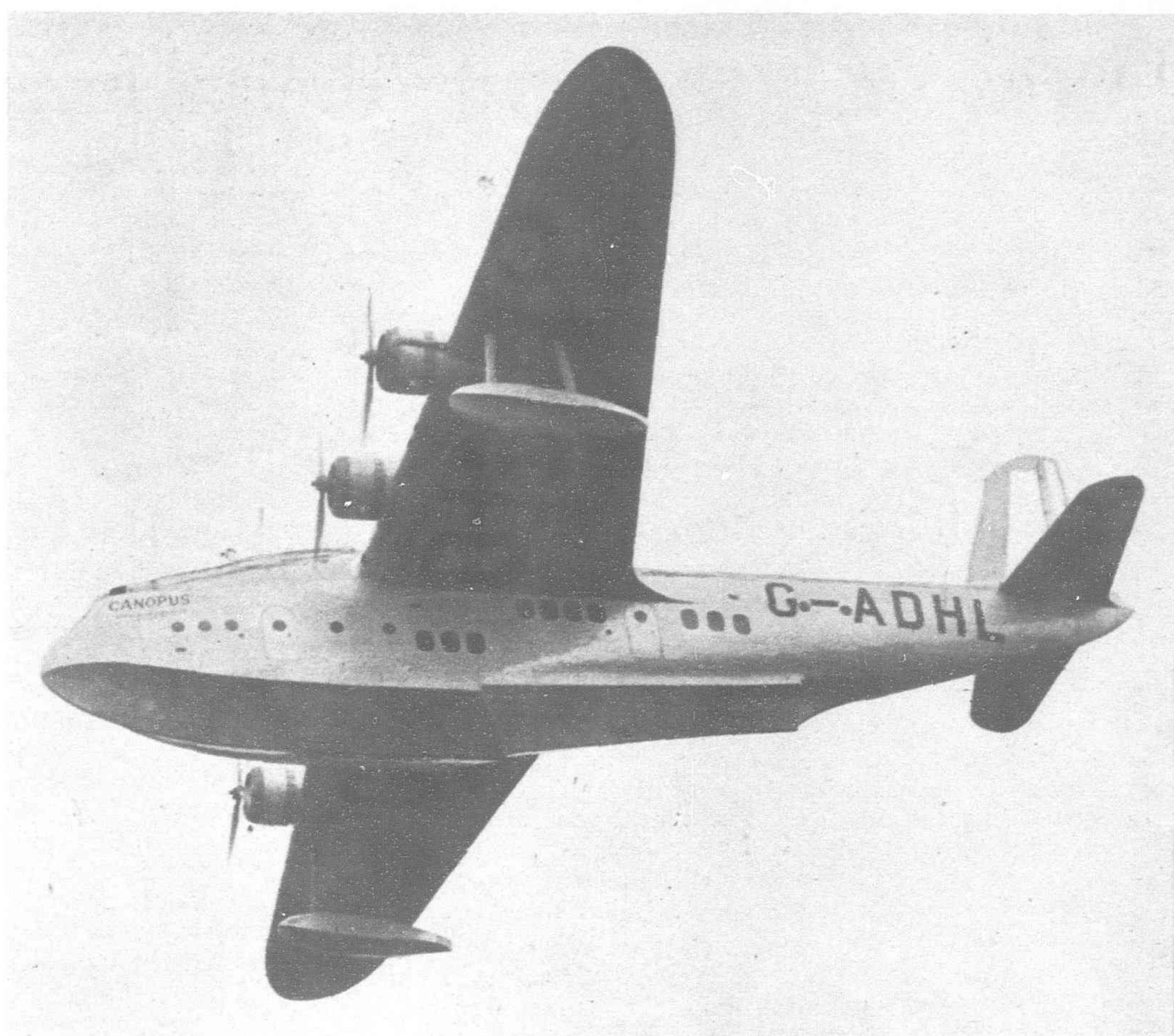
*Centaurus* will also have long range fuel tanks to permit it to take part in transoceanic flights.

*Cambria* is scheduled for the Mediterranean service and will have normal fuel capacity.

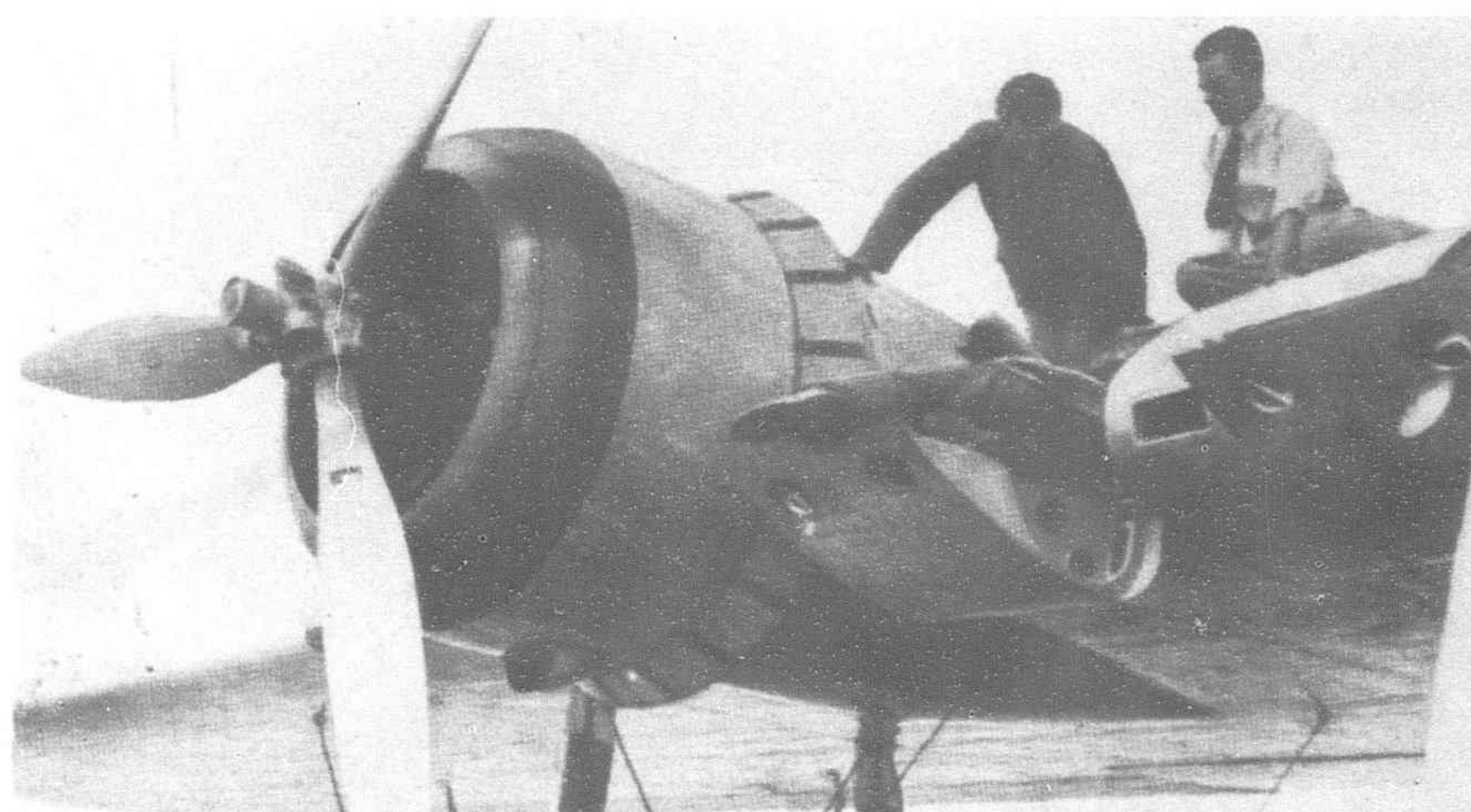
*Castor*'s base will be the terminus of the Air route to Australia.

The machines are of imposing dimensions. The total span is 114 feet (34.75 meters), the overall length is 88½ feet (27 meters) and the height is 29½ feet (9 meters). The total loaded weight is 17½ tons. They are built entirely of metal except for certain portions of the wings and of the tail unit, which are fabric covered. The high performance which is required of them necessitates a high wing loading and consequently they are equipped with controllable pitch airscrews to assist take-off, and flaps on the trailing edges of the wings to steepen the glide and reduce alighting speed. These flaps, however, were not required during the trials of *Canopus* with nearly full load on board. The boat took off in good time without their use.

An interesting feature of the hull is that it is divided forward into two decks; the upper deck is the crew's quarters and contains compartments for mails and cargo, while the lower deck is devoted to passengers and provides roomier and more luxurious accommodation than in any air liners yet in service. Since the scheme for Empire airline expansion necessitates flying by night as well as by day, sleeping berths for sixteen passengers are included.



A view of the Flying-boat "Canopus" in flight

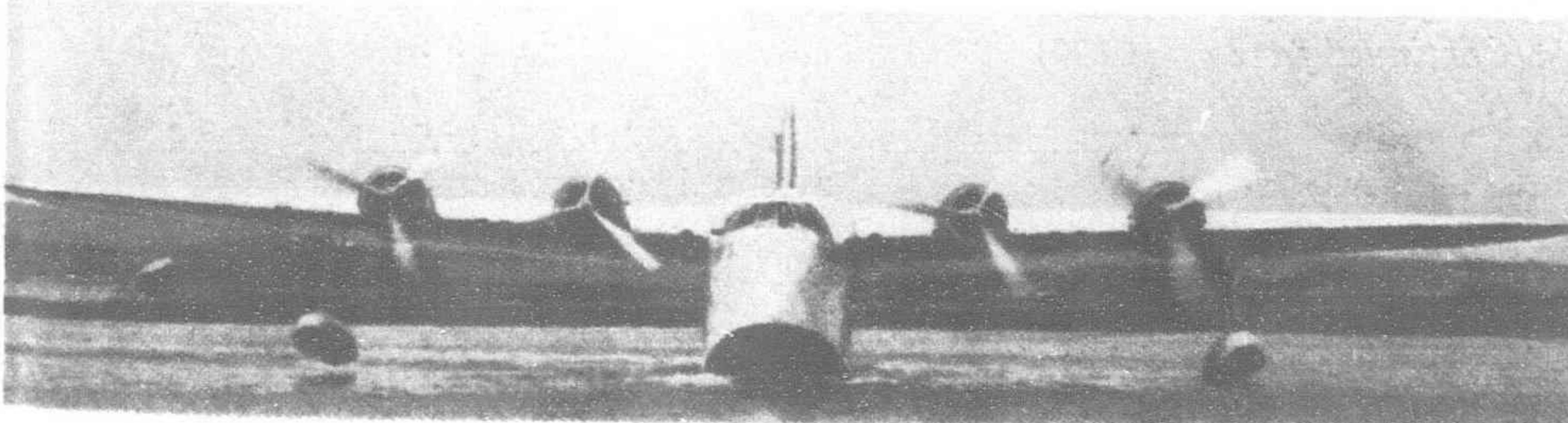


Another view of an Engine Nacelle and one of the servicing platforms on the Empire Boat

A certain number of the boats will be equipped with "Bristol" Perseus sleeve valve engines, but to the majority Pegasus Xc engines are being fitted. Four of these civil rated engines, which have been specially developed for passenger transport work, each normally rated at 785/815 b.h.p. at 4,500 feet (1,370 meters), provide a total of 3,680 b.h.p. per machine for take-off. This power is available at an engine speed of 2,475 r.p.m. with the De Havilland-Hamilton variable pitch airscrew, with which the engines are fitted, set in the fine pitch position.

The engines are enclosed in long chord cowlings which incorporate "Bristol" controllable gills. The latter permit the quantity of cooling air passing through the cowling to be varied, thereby enabling the most efficient amount to be used under all conditions of flight. Cylinder temperatures on the climb and while taxiing are under control by setting the size of the gill openings, and in practice these temperatures are normal.

The tests which the first Empire boats have been put through reveal that an exceptional degree of quietness has been achieved in their cabins. This estimable feature is due not only to the care in which sound proofing was studied when laying down the design but also to the "Bristol" exhaust manifolds incorporated in the cowlings, and the intrinsic quietness of operation and lack of vibration which are special features of the "Bristol" engines employed.



A head on view of the Empire Boat, showing the clean lines which characterize this aircraft

# Native Industries and Foreign Investments in China

By SUNG SEU-SHIH

(Translated by Fang Fu-an, Editor of "Chinese Opinions on Current Events" from "Chiu Liao Monthly," February 15, 1937)

**C**HINESE industries had their beginning about seventy years ago, but at the start only military equipment was made. It was not until 1869 that the first ship built in Shanghai was launched, and in 1876 the first railway of 15 miles between Shanghai and Woosung was built.

During 1881 and 1894 Chang Tse-tung established a number of silk filatures in Kwantung, and in Shanghai a machine-shop was opened. During these years a copper smelting-plant was established in Kweichow, and some match-factories in Hupeh.

After the Sino-Japanese war China's infant industries sustained a severe setback as the Powers took advantage of the exposed weakness of China to establish factories in her territory, particularly spinning, weaving, and flour mills. With ample capital behind them they can easily beat their Chinese rival.

In 1907 the Yangtze Engineering Works was opened with a capital of one million taels, and was one of the biggest works China had at that time. The same year a cement works was opened by the Nanyang Tobacco Co. while in Shanghai, Nantung, Hangchow and Soochow cotton-mills were established and two new banks were organized, namely the Bank of China and the Bank of Communications.

In 1912, and again in 1914, the Government made plans to build roads and establish cotton-mills, but because of unsettled conditions not much progress was made. During the Great War most of the Powers were engaged exclusively in the manufacture of munitions and had no time to engage in activities in the Far East, consequently noticeable progress was made by Chinese industries. Natural calamities as well as unsettled political situations hindered the development of the infant industries, and now they are again under the yoke of foreign capital.

The first foreign factory established in Shanghai was the dockyard opened by William Muirhead in 1851, which later became the Shanghai Dock & Engineering Co. From 1851 to 1894 there were only nine factories established by foreigners in China, including silk filatures, ice-factories and electric shops. During the next ten years a firm foundation was laid by foreigners and seventeen new factories were started, including spinning and weaving mills, tannery, flour mills, cigarette factories, etc. The next 15 years (from 1905 to 1919) was a period of progress, as 24 new factories were set up, 13 of which were owned by Japanese. Glassworks and steelworks were started among others. Great progress was made during the 14 years from 1920 to 1933, not less than 50 new factories being started, with only 18 closing down. Among the new factories were some light industries, such as shoe factories, hat factories, and canned goods industries.

At present Japan has 51, Great Britain 23, the U.S.A. 14 while Germany, France and Italy have each three factories in Shanghai. The British have invested \$400 million, Japanese \$147

million, Americans \$113 million, and the French \$24 million, but it must be pointed out that though Great Britain appears to have put up the biggest amount, this is not so in fact, because the figures quoted include the capital of British firms having interests in China, but not exclusively invested in this country. Strictly speaking, the Japanese come first, American second, and the British third in the amount of capital actually invested in China.

With such a strong footing in the country, foreign manufacturing interests in China are an obstacle to Chinese industries. As a Japanese observer has well said, unless the Chinese can shake off the shackles of foreign capital it is very hard for Chinese capital to develop industrial enterprise. According to the Bureau of Social Affairs of the City Government of Greater Shanghai, China had in 1928 invested \$100 million in industries in Shanghai, or an average of \$70,000 per establishment. In the same year foreign capital similarly invested was found to exceed \$200 million, with an average of \$1,220,000 per establishment. Foreign capital has increased to \$400 million, while the figures of 1933 for investments in Chinese factories totalled only \$180 million. These figures speak for themselves, and clearly indicate the weak position of Chinese interests. The following figures show the total foreign capital invested throughout the whole of China:—

| FOREIGN CAPITAL IN CHINA |    |    |                     |       |
|--------------------------|----|----|---------------------|-------|
| Great Britain            | .. | .. | U.S.\$1,189,200,000 | 36.7% |
| Japan                    | .. | .. | 1,136,900,000       | 35.1  |
| Soviet Russia            | .. | .. | 273,000,000         | 8.4   |
| U.S.A.                   | .. | .. | 196,800,000         | 6.1   |
| France                   | .. | .. | 192,400,000         | 5.9   |
| Germany                  | .. | .. | 87,000,000          | 2.7   |
| Belgium                  | .. | .. | 86,000,000          | 2.7   |
| Holland                  | .. | .. | 28,700,000          | 0.9   |
| Italy                    | .. | .. | 46,400,000          | 1.0   |
| Others                   | .. | .. | 3,900,000           | 0.1   |
| Total                    | .. | .. | U.S.\$3,242,500,000 | 100.0 |

Such is the condition of foreign investments in China, and as most of these enterprises are established in foreign concessions under extra-territorial conditions they are not affected by the political situation in the country. During the last two years foreigners have been still more active in the establishment of factories, and Japan alone has no less than 380 factories in the Yangtze Valley. Our protective tariffs have not been effective in curbing further inroads upon Chinese industries, and the question arises: What must we do when we see, for example, what India has to suffer as a result of depending upon foreign capital to run her industries?

## Diesel Electric Trains for the Ceylon Government Railways

(Continued from page 150)

compartment, thus making an 8-coach train. Also, when required, it will be possible to take out one coach and run the remaining three coaches as a unit, giving increased performance and enabling the unit to be used for different classes of traffic and on routes which necessitate negotiating severe gradients.

It will be appreciated that considerable development work has been associated with the design of these trains, and that in this article it has not been possible to go into the many interesting details. The unique position of the Company in designing and

manufacturing the complete trains, including diesel engines, electrical equipment, mechanical parts and bodies, has made this development possible, and the Company's long experience in all forms of railway traction is an additional guarantee of satisfaction.

The Ceylon trains described are typical of the latest development of the traction department, but it should be mentioned that the Company also has under construction a number of railcars embodying the same principles and employing straight electric and Diesel-mechanical transmission.

# Fast Cargo Liners for Orient-Europe Service

*Akagi Maru* and *Arima Maru* Equipped with M.S.D.  
Diesel Engines Built by Mitsubishi Nagasaki Shipyards

By O. TAJI

**A** CONSIDERABLE improvement was made in the N.Y.K. Orient-New York service, when six fast cargo motor ships of the *Noto Maru* type were placed in commission. Some time ago, the company decided to inaugurate an express freight service between Yokohama and Liverpool, and ordered in succession five express cargo motor liners from the Mitsubishi Nagasaki Shipyards.

Of these the *Akagi Maru* and *Arima Maru* are sister ships, and the following description deals with them.

The *Akagi Maru* is the first ship built for this service. Her keel was laid down on December 2, 1935, at the Mitsubishi Nagasaki Shipyards, and she was launched on June 6, 1936, and completed on September 10, 1936.

The principal characteristics are as follows:—

|                               |                   |
|-------------------------------|-------------------|
| Length overall                | 147.755 meters    |
| Length between perpendiculars | 140.000 m.        |
| Breadth moulded               | 19.000 m.         |
| Depth moulded                 | 10.500 m.         |
| Fully loaded draught          | 8.394 m.          |
| Gross register                | 7,366.94 tons     |
| Net register                  | 4,352.81 tons     |
| Deadweight capacity           | 9,630.00 tons     |
| Cargo capacity                | 14,810.00 cu. ft. |
| B. H. P., normal              | 8,000             |
| B. H. P., trial               | 8,771             |
| Designed trial speed          | 18.5 knots        |
| Actual trial speed            | 18.979 knots      |

The vessel was constructed under the provisions of the Japanese Ship Improvement Facilities Act, and under the special survey of the Japanese Ministry of Communications, the Imperial Marine Corporation and Lloyd's Register of Shipping, and is classified as a "First-class Ocean-service Vessel," NS\*,  $\oplus$  100A1 with L.M.C. and R.M.C. by these authorities respectively.

## General Arrangement

The *Akagi Maru* is a vessel of the heavy-deck type, with a short forecastle, extensive bridge erections, and a poop. There are two continuous steel decks, two vertical masts, two twin posts and one large streamlined dummy funnel, a raked straight flexible stem and a cruiser stern, to which a Mitsubishi patent streamlined rudder is fitted.

The form of the lines and the propeller were decided after exhaustive tests had been carried out at the model experimental tank of the builders, particularly in connection with the stern form, bossing, propeller form, and the streamlined rudder, in order to attain a material improvement in the propulsive efficiency. The results of the official trials confirmed the model results, and showed that the lines and propeller adopted were most satisfactory.

On account of the high speed of the ship and the high-powered double-acting engine, the utmost precaution was taken for the

prevention of vibrations, and a special structural design was adopted. Consequently, no vibration has been experienced at the service speed as well as at the maximum speed.

Subdivision is effected by eight watertight bulkheads extending to the upper deck, into the fore and aft peak tanks, machinery room and six cargo holds. The double bottom extends over the whole length of the ship and is utilized as fresh water, fuel-oil and ballast tanks. Further, wing tanks are arranged under No. 6 cargo hold, and deep tanks at sides immediately forward of the after bulkhead of the engine-room, the total capacity being about 1,405 tons. Additional transverse and longitudinal oil-tight bulkheads are introduced in No. 4 hold, below the second deck immediately aft of the machinery space, to form a nest of four deep tanks separated from each other by cofferdams for the transport of different cargo oils, the total capacity being about 1,290 tons. These tanks are fitted with heating coils for the easy delivery of oil. Three frozen cargo spaces, with a total capacity of about 169 tons, are arranged on the second deck near amidships. An evaporator-room is situated adjacent to the starboard frozen cargo chamber, and two 60,000 B.T.U. refrigerating machines are installed in the engine-room for the safe transport of perishable cargo.

On the second deck over Nos. 2 and 5 cargo holds, two silk-rooms with a total capacity of about 349 tons are located athwart, the provision being made for the complete heat and damp insulation. In the poop, a special cargo room of a capacity of 49 tons is arranged to carry valuable cargo, the insulation being similar to that of the silk-rooms. Further, a mail-room of about 56-tons capacity is allotted on the upper deck near amidships.

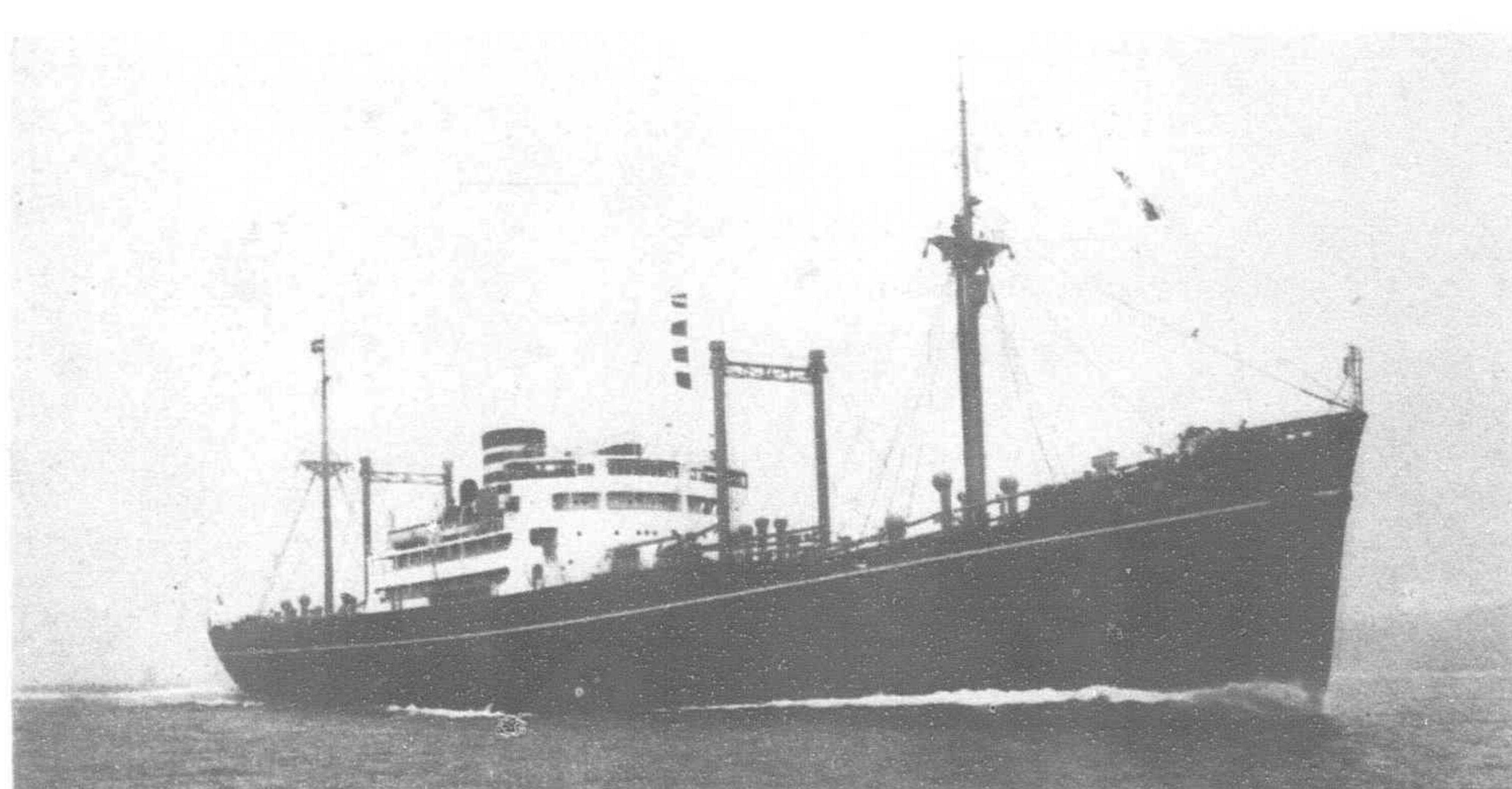
Living spaces for the officers, engineers and other ratings are arranged above the lower bridge deck amidships; the crew is accommodated on the lower bridge deck, whilst the captain's day and bedrooms, wireless telegraphy office, gyro-compass room, two staterooms and a spare room are arranged on the boat deck forward. The staterooms and spare room are comfortably furnished with box-spring beds, chairs and a table, and necessary fittings. On the upper bridge deck amidships are the chief engineer's room, chief officer's and other officers' and engineers' rooms, toilet and bathrooms, etc., while a spacious comfortable dining-saloon is situated at the front, and a common mess-room for the officers and engineers at the aft part.

Simple and pleasing styles have been adopted for the decorating and furnishing of the accommodation, particularly for that portion devoted to passengers. The dining saloon is panelled with Japanese oak and soft wood finished in colored lacquer; beams are neatly covered and the ceiling is in soft wood finished in white. The furniture has been chosen to match the style of decoration in which it is set.

All the living quarters are adequately ventilated and heated. It will be appreciated that the accommodation generally conforms to a particularly high standard.

## Cargo Facilities

The large cargo capacity of the holds and 'tween decks has necessitated the provision of cargo handling appliances on a



M/S "Akagi Maru" on trial run off Nagasaki

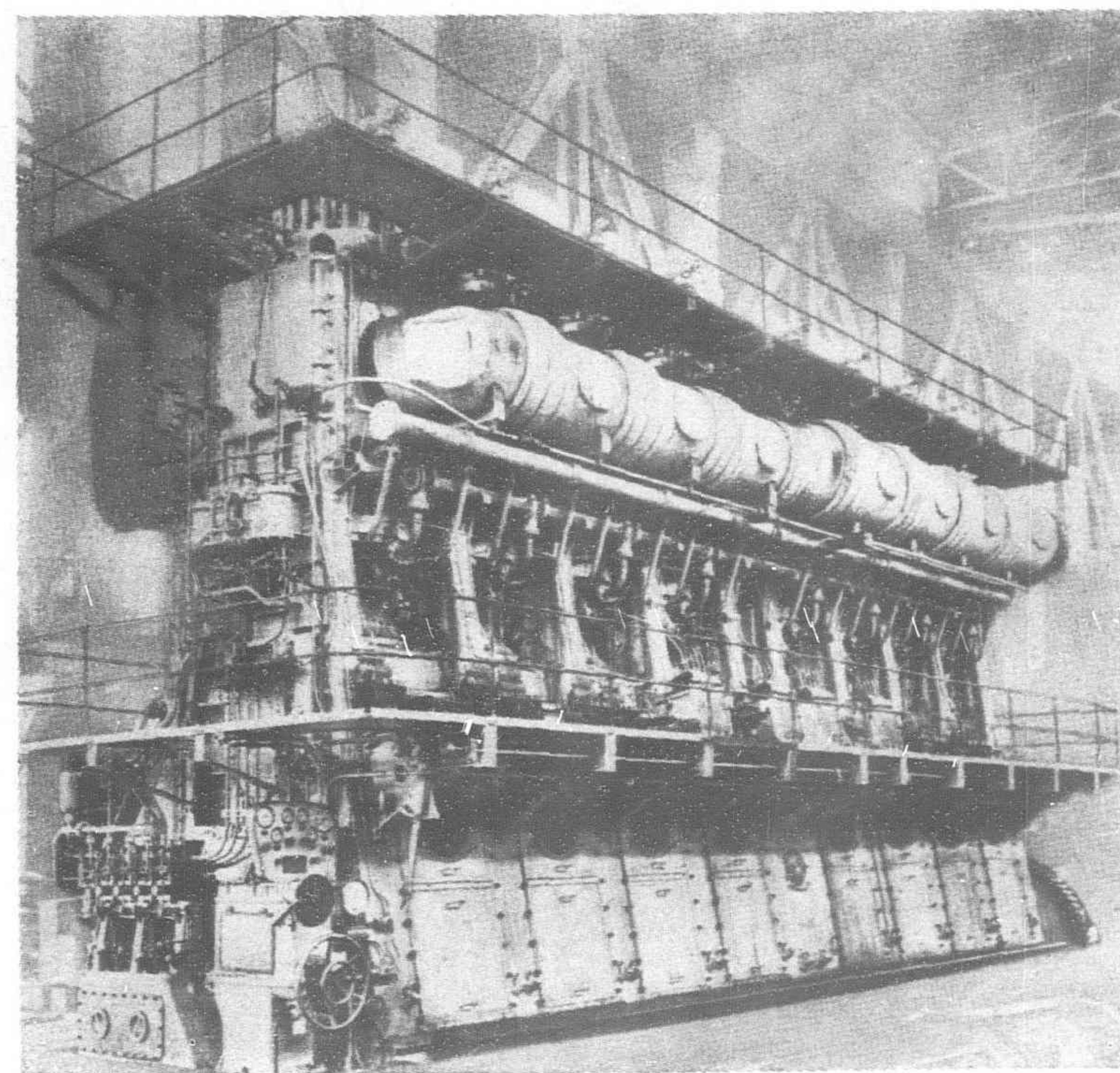
generous scale, and special care has been taken by the ship-builders to ensure a high degree of efficiency in the loading and discharging operations in order to minimize the time spent at ports in conjunction with a fast navigating speed, as the vessel has to call at a considerable number of ports, especially on the route between Yokohama and Liverpool.

The six hatchways are served by 19 tubular steel derrick booms. These are supported on the fore and main masts, two twin derrick posts on the upper deck at the fore and aft ends of the bridge deck, and on the bridge front which is specially reinforced for the purpose, as indicated on the plans and in the photograph of the ship. For operating the derricks, there are installed 18 electric winches, supplied by the Mitsubishi Electric Engineering Co., Ltd., of which twelve are of 3 ton capacity and five are of 5 ton. One of the derrick booms is for heavy duty with a capacity of 40 tons and is operated by two 10-ton drums of two 5-ton winches for the fore mast. The winches take direct current at 220-volts from the ship's circuit, the total power required being 738 h.p.

The accompanying table indicates the sizes of the various hatchways, and the lifting capacities of the derricks and winches available.

| Hatch-way No. | Dimensions at upper deck, m. | Derricks |                |               | Winches |                |                 |
|---------------|------------------------------|----------|----------------|---------------|---------|----------------|-----------------|
|               |                              | No.      | Capacity, tons | Where mounted | No.     | Capacity, tons | Where installed |
| 1             | 5.85 x 5.0                   | 2        | 6              | f. m.         | 2       | 5              | u. d.           |
| 2             | 11. 2 x 6.1                  | 2        | 10             | f. m.         | 2       | 5              | u. d.           |
|               |                              | 1        | 40             | f. m.         |         |                |                 |
| 3             | 9. 6 x 6.1                   | 2        | 3              | t. p.         | 2       | 3              | u. d.           |
| 4             | 8 x 6.7                      | 2        | 6              | t. p.         | 2       | 3              | b. d.           |
| 5             | 11. 7 x 6.1                  | 2        | 3              | b. f.         | 2       | 3              | b. d.           |
| 6             | 7. 2 x 5.5                   | 2        | 10             | t. p.         | 2       | 5              | u. d.           |
|               |                              | 2        | 6              | m. m.         | 2       | 3              | u. d.           |

N.B.—f.m.—fore mast, t.p.—twin posts, b.f.—bridge front, m.m.—main mast, u.d.—upper deck, b.d.—bridge deck.



View of the main engine, M/S "Akagi Maru"

Nos. 3 and 4 hatchways, on the second deck, are provided with hatch web-beams fitted with Mitsubishi-Macanking type sliding rollers for speedy cargo handling.

The cargo holds and 'tween deck spaces are unusually well ventilated. Under the forecastle deck, fore and aft parts of the bridge deck and poop deck, are arranged four fan-rooms, in which five Mitsubishi ordinance fans are installed. Fresh air is delivered to the holds and cargo spaces through ventilation trunks extending throughout these spaces, and well into the deepest corners of the holds.

Special care is taken for fire detection and extinguishing. The Lux-Rich fire extinguishing system is arranged throughout the ship, and a fire-detector cabinet is installed on the navigation bridge. Eighty-three liquified CO<sub>2</sub> bottles are stowed in a room located at the port side on the upper deck

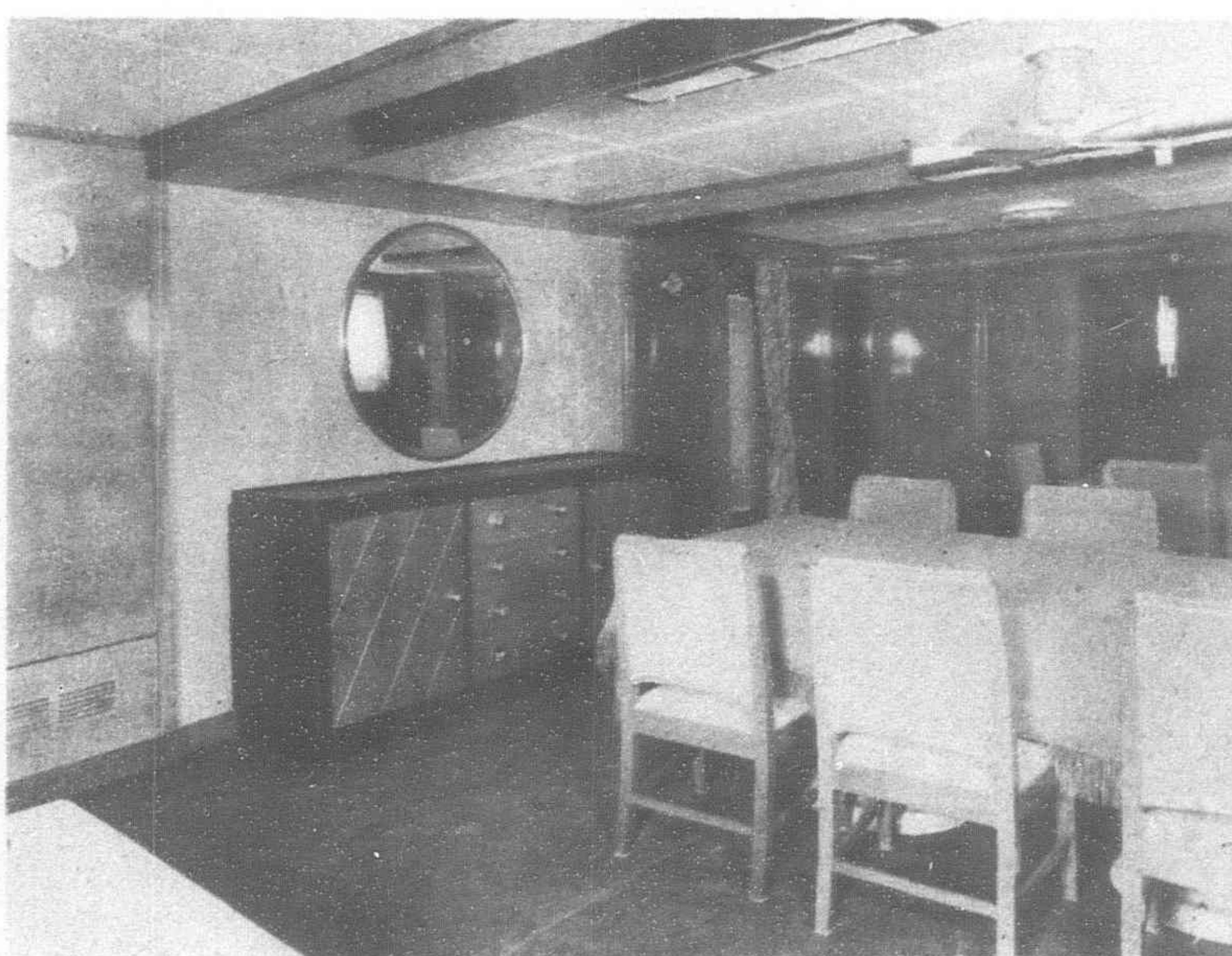
midships, and CO<sub>2</sub> gas can immediately be delivered to any part on board where a fire breaks out.

In compliance with the requirements of the U.S. Health Board, a complete rat preventing device is provided to the cargo holds, 'tween deck spaces, stores, cabins, etc.

#### Windlass, Mooring Winch and Steering Gear

The windlass is electrically driven, and controlled on the booster system, the contactor gear being installed in a compartment in the forecastle 'tween decks. The mechanical part has been supplied by the Yutani Engineering Works, Ltd., and the electric part by the Mitsubishi Electric Engineering Co., Ltd. The motor takes current at 220-volts and develops 90 h.p., this power being sufficient to exert a pull of 20 tons at a hauling speed of 10 meters per minute. An anchor telegraph and voice pipe are mounted on the forecastle head.

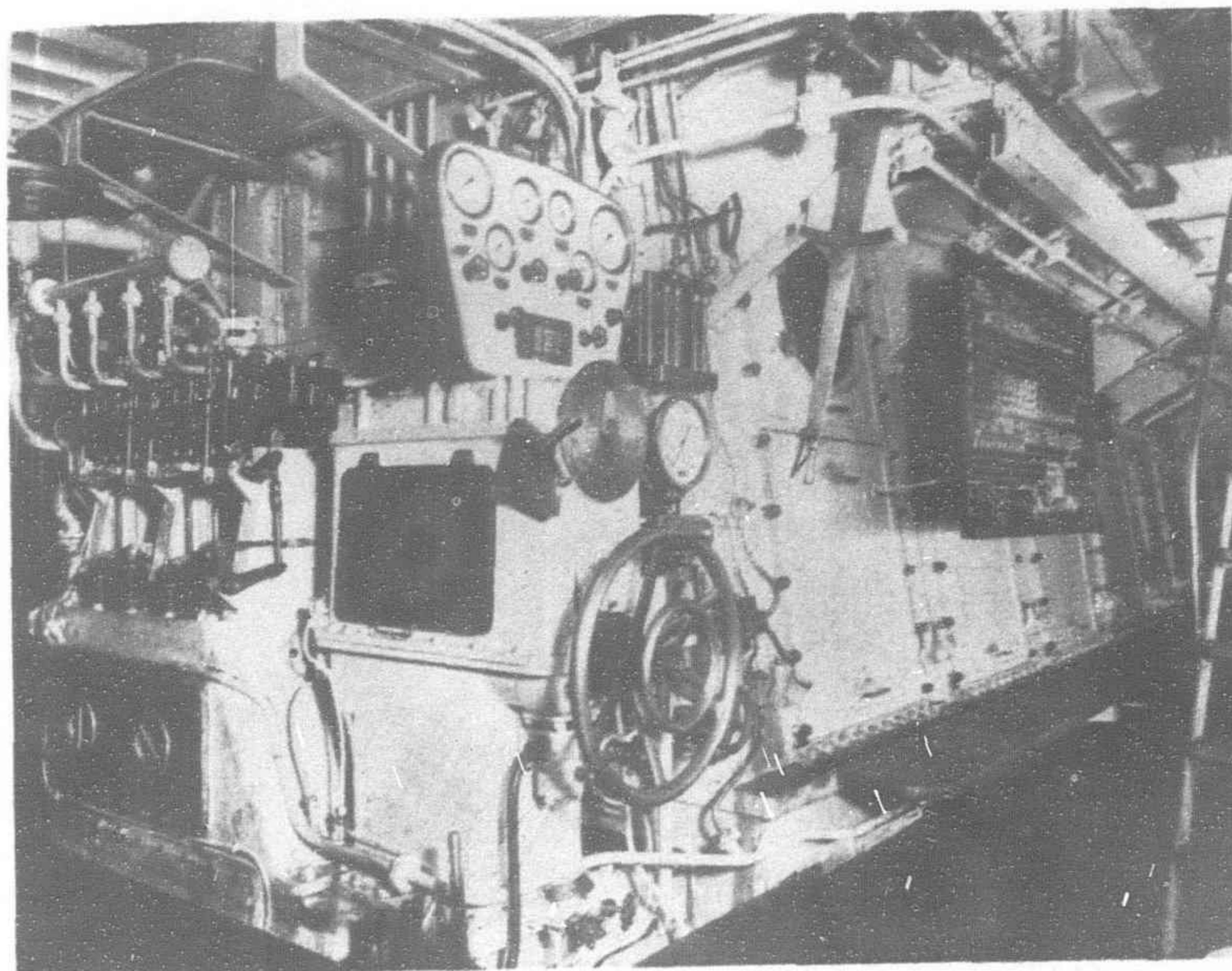
On the poop deck forward an electrically driven mooring winch with extended warping ends has been installed. This unit has also been provided by the Mitsubishi Electric Engineering Co. The electric motor, which operates on direct current at a pressure of 220-volts, is capable of developing 57 h.p., sufficient to give a pull of 10 tons.



Dining saloon, M/S "Akagi Maru"



Dining saloon, M/S "Arima Maru"



View of the engine room manoeuvering platform, M/S "Akagi Maru"

The steering gear has been supplied by the same firm, and is of the Mitsubishi all-electric type. The electric motor is designed for operation at 220-volts and develops 19 kw. The steering gear, installed in a special compartment on the after end of the upper deck, is controlled from the flying bridge and the poop deck.

### Navigating and Life-Saving Equipment

The navigating equipment comprises two sets of patent standard azimuth compasses, a Sperry's gyro-compass and receivers, one spirit steering compass, one complete set of long-and short-wave wireless apparatus and one auxiliary set, one radio-direction finder, electric engine-room telegraphs, special echo-sounding machines, electric helm indicators, loud-speaking telephones, electric distance thermometers, 20 inch searchlight projectors, and other necessary instruments. The echo-sounding machines are fitted in Nos. 1 and 2 ballast tanks, and the depth of sea is measured by fathometers fitted in the wheel-house, the complete equipment having been supplied by the Tokyo Measuring Instrument Manufacturing Co., Ltd.

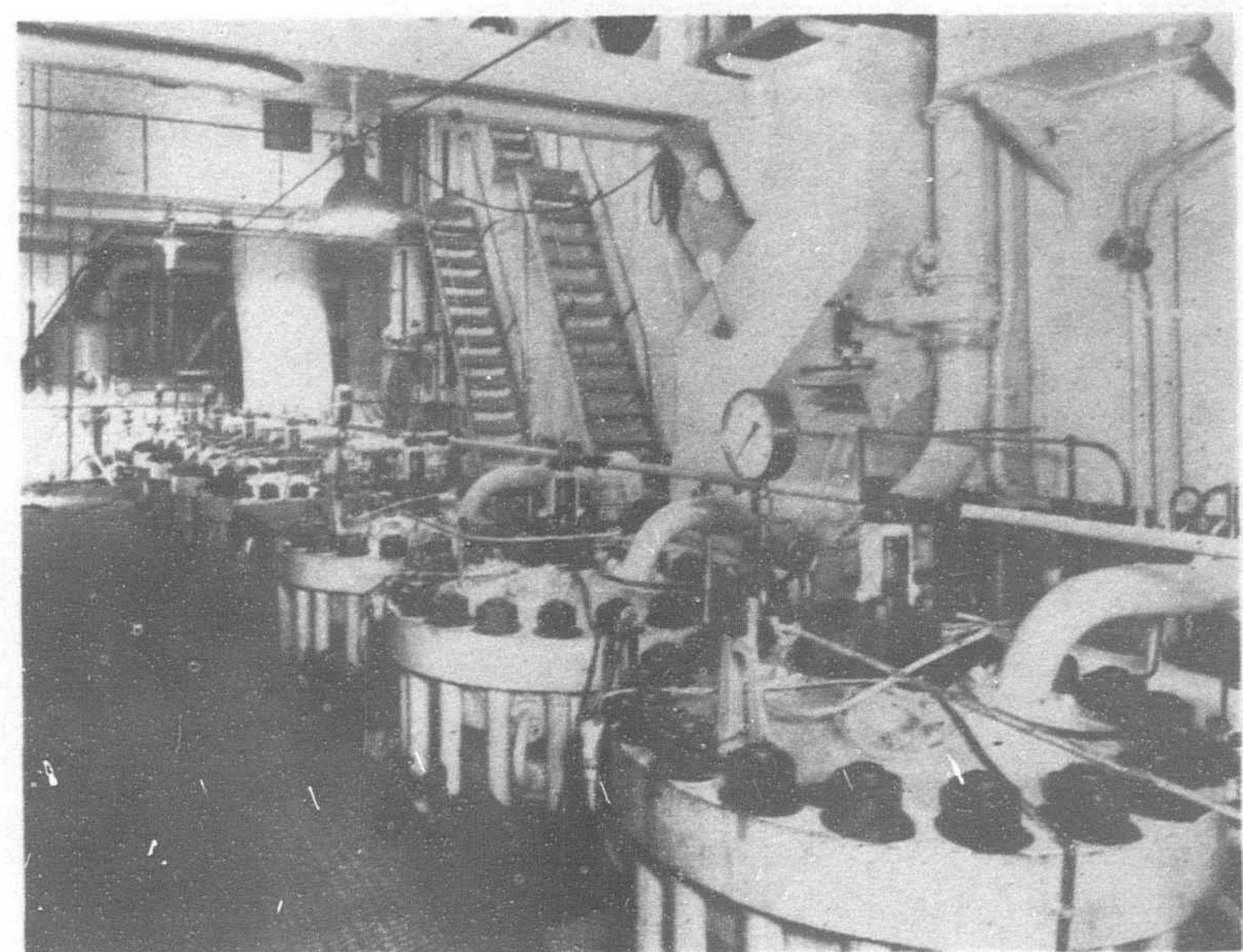
The life-saving appliances consist of two lifeboats of 9.15 m. by 2.99 m. by 1.27 m., each for 76 persons, a "temma" (Japanese junk) 6.1 m. in length, lifebuoys, jackets, etc. For handling the lifeboats, Mitsubishi patent boat-davits have been installed on the boat deck, the "temma" being stowed under ordinary davits.

### The Main Engine

The main propelling machinery comprises one set of Mitsubishi MSD type double-acting two-cycle airless-injection Diesel engine with eight cylinders of 720 mm. bore and 1,200 mm. stroke, developing normally 8,000 b.h.p. at 110 r.p.m. The overall length is 16,570 mm., the height from the crankshaft center to the top of cylinder covers 7,500 mm., and the width at the bedplate surface 3,600 mm.

It may be mentioned that the single-acting engine of this type is named "MS" type, taking the initials of the Mitsubishi concern and of the inventor, Mr. K. Shimizu, who is the chief designer of Diesel engines at the Mitsubishi Nagasaki Works, whilst the double-acting type is named "MSD," signifying "Mitsubishi-Shimizu-Double-acting."

The cylinders, frames and bedplate forming the main body of the engine are bolted together by through tie rods, which take the tension stresses due to the pressure in the cylinders,



Cylinder top in the engine room of one of the sister ships

which are connected with each other by flanged joints so as to form a rigid cross-beam.

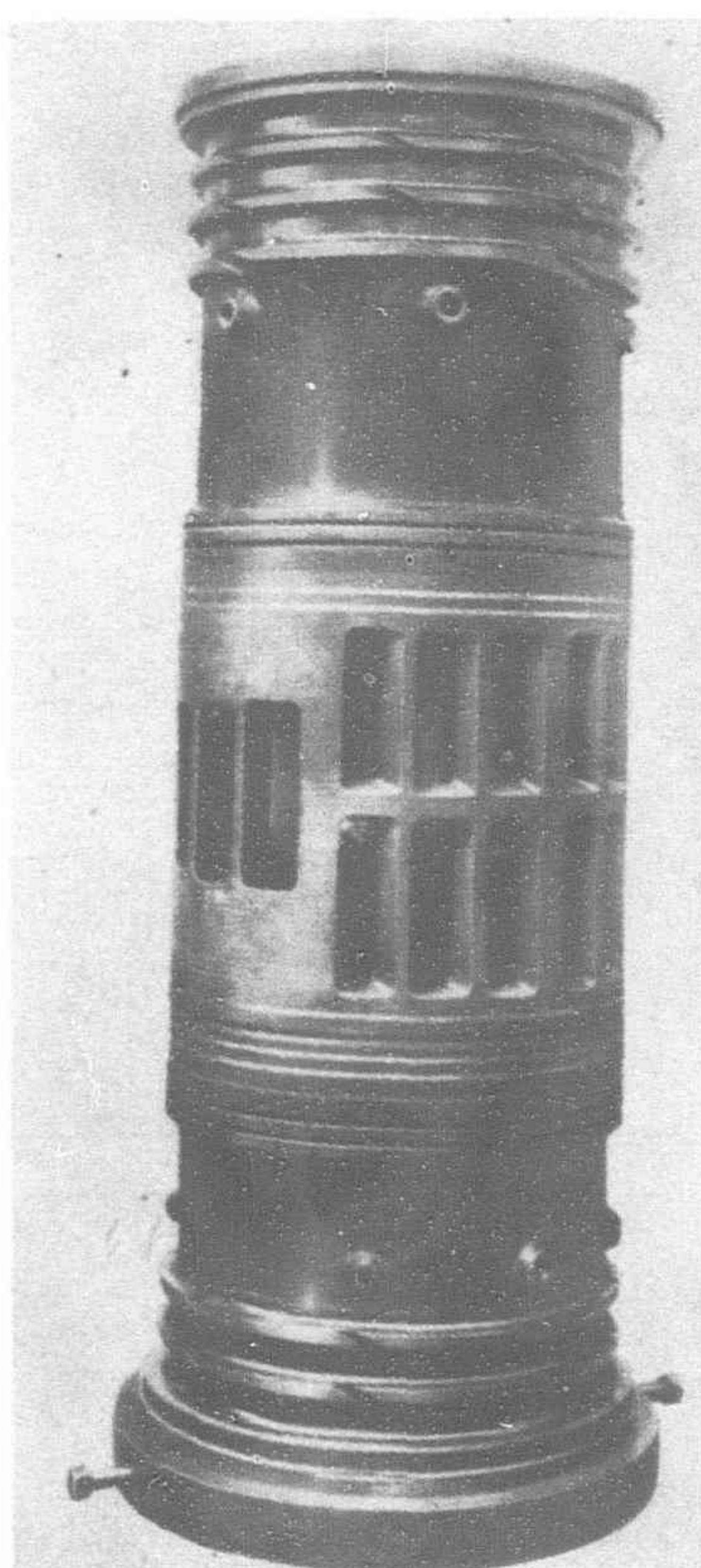
Instead of the usual turbo-blower, reciprocating double-acting scavenging air pumps are arranged at one side of the engine. Each cylinder has its own scavenging pump directly driven by the engine through a beam attached to the lower part of the piston rod. At the other side of the engine, is an exhaust manifold, which is so well lagged that the insulation is as good as the water-jacketing. This arrangement enables not only a considerable reduction of the area; but also an expensive independent turbo-blower and a powerful generator for supplying current to the blower motor are dispensed with. As a result, a considerable economy is made in the engine-room department.

The scavenging air system is the Mitsubishi port-scavenging method developed by the builders and covered by Japanese patent No. 83041.

The cylinder wall has three groups of the right and left-hand inlet ports. The shape is so designed that the entering air passes upwards or downwards along the cylinder wall and impinges against the under side of the top cylinder cover, or the upper side of the bottom cylinder cover, where the kinetic energy of the flowing air is transformed into pressure and drives the exhaust gas out of the cylinder through the exhaust ports, which are arranged on the opposite side of the inlet ports. Two pairs of the right and left-hand scavenging air port groups have a different number of ports, in order to provide turbulent motion of the air around the axis of the cylinder after scavenging and filling with air. The quantity of scavenging air required is 1.2 to 1.3 times the combustion cylinder volume.

This system was at first adopted in the single-acting engine, and the result was very satisfactory. In applying the same method to the cylinder bottoms of the double-acting engine, exhaustive experiments were carried out, and the method was confirmed to be as efficient as in the case of the single-acting cylinder.

The fuel injection is effected by the automatic valve fuel-injection system with control valves, which was invented by the builders. The system comprises fuel-oil pumps, fuel-oil control valves fitted on the engine at level of the middle platform of the engine, and automatic fuel-injection valves on the top and at the bottom of the upper and lower cylinder covers. Fuel oil is delivered to the pumps through filters, and is discharged under pressure by plungers to a large fuel-oil pipe leading to the fuel-oil control valves. This piping serves as a fuel-oil reservoir, the pres-



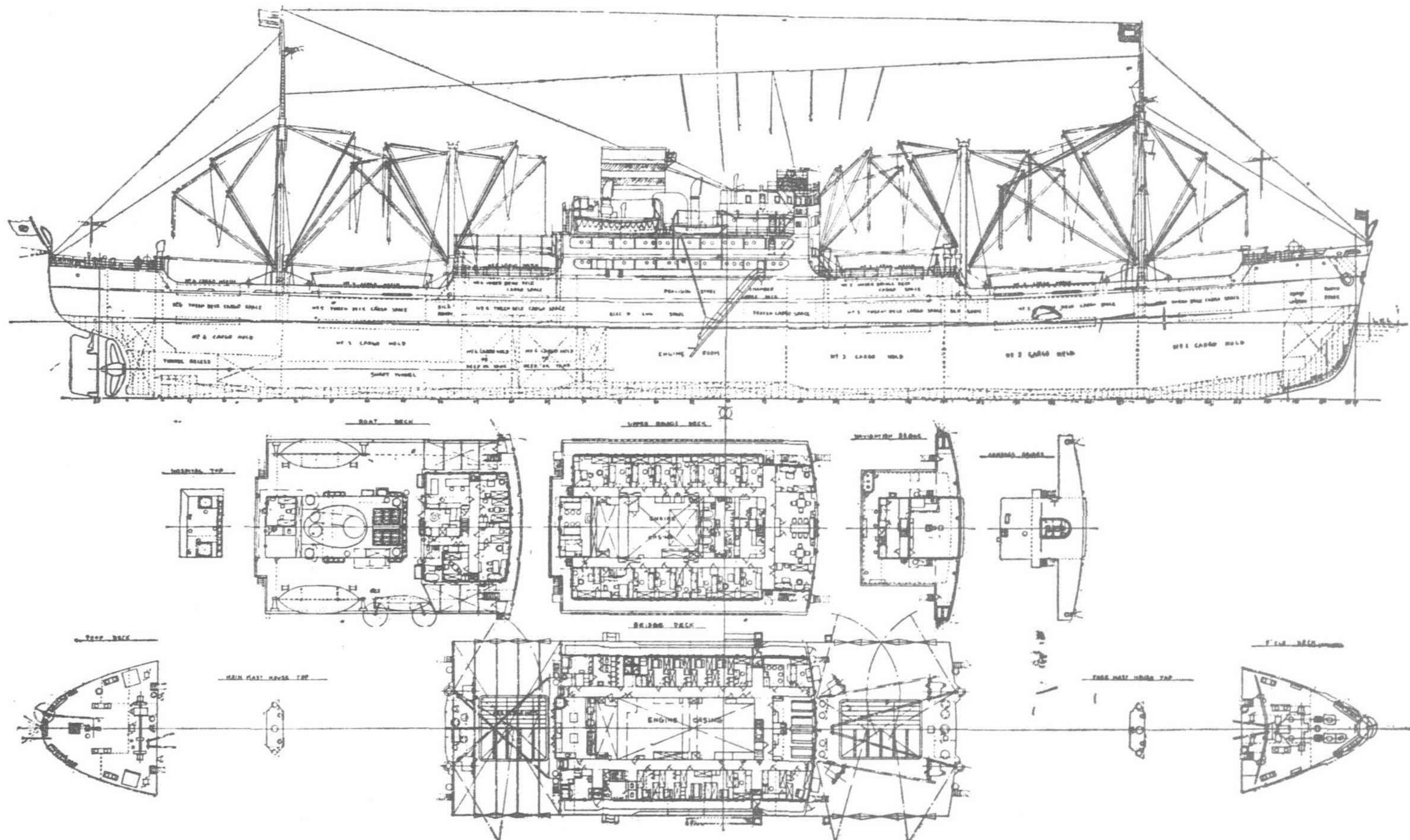
The cylinder liner

sure being kept constant. When the control valves are open, oil is delivered to the injection valves through long pipes, and is injected into the top and bottom combustion chambers through automatic injectors. Before entering the control-valve chamber the oil passes through fine filters.

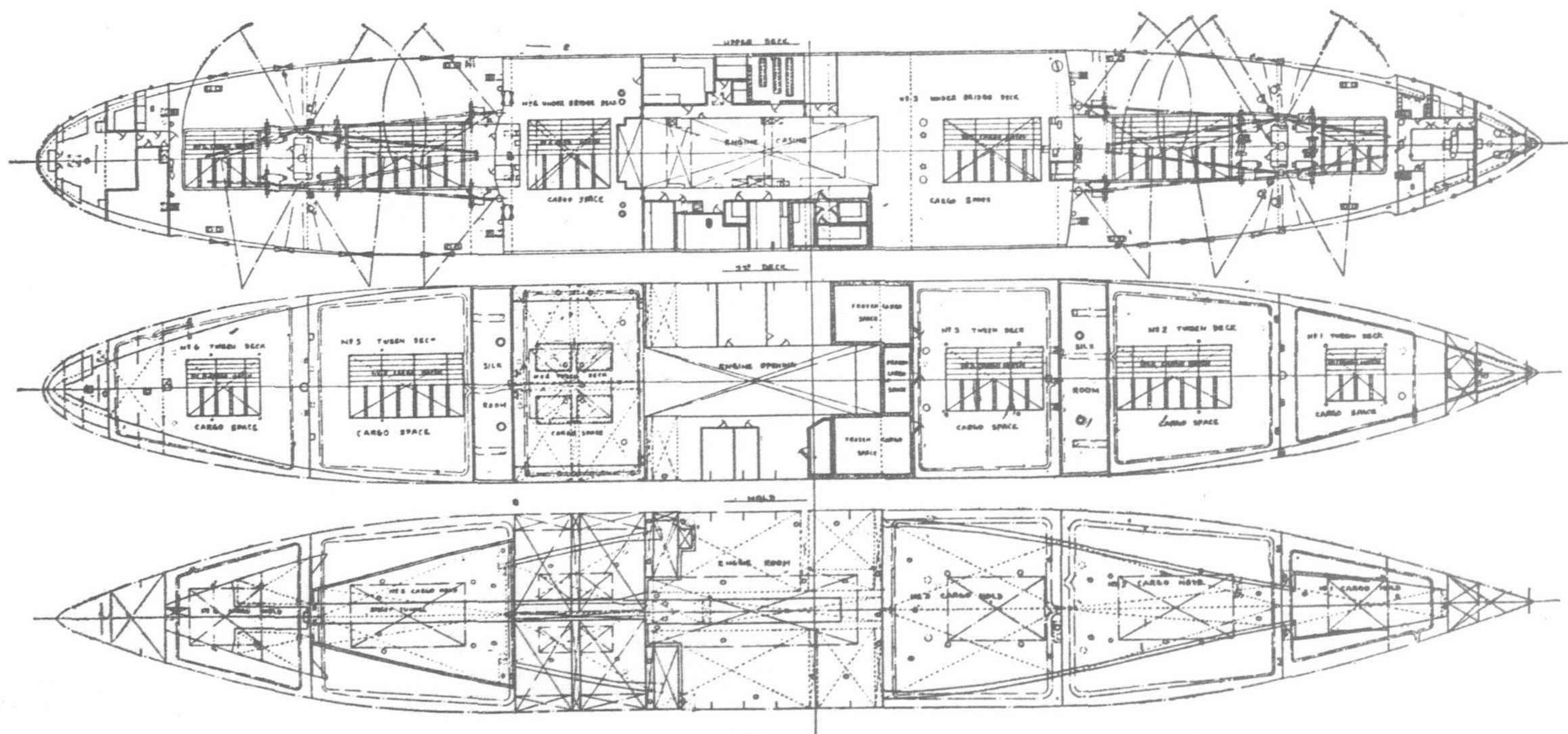
The system is similar to that adopted in the single-acting engine, but various experiments were carried out for the shape of the combustion chamber, the position of the fuel valve, fuel nozzles, etc. in connection with the cylinder bottom. This system is not only superior in its performance, but also no trouble has ever been experienced in any previous single-acting engines.

The piston rod is covered with an external protective pipe of special cast iron and also has an inner tube at the center so as to prevent the damage of the rod due to heat stress.

The cooling of the piston and the piston rod is effected by fresh water. The cooling water is taken from telescopic pipes moving with the piston, and reaches the piston crown and bottom through spaces between the piston rod and the outer tube of the piston rod, and the telescopic pipes, after the cooling is effected. A jet-system is adopted, and every precaution is taken for the prevention of water-hammering and mixing of the cooling water with lubricating oil in the crank-chamber.



Sketch showing general arrangement of M/S "Akagi Maru"



General arrangement of M/S "Akagi Maru"

For manœuvring the engine, compressed air and oil pressure are used, the handling being simple and the operation accurate. The starting is effected by using the lower parts of the cylinders, and the firing immediately takes place in the upper parts of the cylinders. As the upper parts are not cooled by starting air, the starting of the engine is very easy.

Apart from those outlined above, the engine embodies many other special features which have been introduced by the builders' experience of long standing. It is considered that the completion of this engine is not only a pride of the builders, but also a success to Japanese marine engineering.

## The Auxiliary Machinery

The auxiliary machinery comprises two Mitsubishi-Sulzer multi-stage air compressors driven through magnetic clutches by the auxiliary Diesel engines, each compressor charging two air reservoirs of 18 cu. m. apiece at 30 kg. per sq. cm.

There are an emergency air compressor, two air reservoirs for the auxiliary Diesel engines, two jacket and piston cooling fresh-water pumps of 360 and 110 cu. m. per hour, two sea-water circulating pumps of 600 cu.m. per hour each, two gear-wheel type lubricating-oil pumps of 80 cu. m. each, one 6 cu.m.-lubricating oil transfer pump of the same type, two fuel oil transfer pumps of the same type, each of 50 cu. m. capacity, and two gear-wheel type fuel-oil service pumps of 6 cu. m., each.

Further, there are one piston cooling-water cooler, two jacket cooling-water coolers, two lubricating-oil coolers, two electric lubricating-oil purifiers, and two electric fuel-oil purifiers.

The auxiliary machinery as well as aforementioned pumps in the engine-room are driven electrically. It consists of one 30 cu. m. bilge pump of the reciprocating type, one 110 cu. m. bilge and ballast pump of the centrifugal type, one 110 cu. m. fire and general service centrifugal pump, one 100 cu. m. oil-cargo reciprocating pump, two 10 cu. m. centrifugal sanitary pumps, and one 6 cu. m. centrifugal fresh-water pump.

There are three Mitsubishi Diesel-engined generators, each driven by an airless-injection four-cycle engine with six cylinders, 275 mm. bore and 420 mm. stroke, developing 330 b.h.p. at 360 r.p.m. ; the dynamos are of the direct-current type, each having an output of 220 kw. at 225-volts, with a speed of 360 r.p.m. There is also one 30 kw. emergency dynamo.

The total electric output of the generators is 690 kw. and the current is supplied to all the electric deck machinery, engine-room auxiliaries, wireless telegraphy and telephony apparatus, electric fans, and for the lighting of the ship. The electric auxiliaries for the deck department are 37 in number, and consume about 1,085 h.p., whilst those for the engine-room department are 29 in number and about 636 h.p. This indicates that the total power required for the auxiliary machinery is about 1,721, which may be considered to be the highest electrification in this class of vessel.

*(Continued on page 166)*

## SHIP No. 627 M.S. AKAGI MARU—SUMMARY OF SEA TRIAL RESULTS

*Fuel Oil used during Trial :—Tarakan Oil.*

| Place   | Off Miye, Nagasaki                 |          |          |          |             |                                    |          |          |          |                   |       |
|---|------------------------------------|----------|----------|----------|-------------|------------------------------------|----------|----------|----------|-------------------|-------|
| Date of Trial   | August 19, 1936                    |          |          |          |             | August 22, 1936                    |          |          |          |                   |       |
| Kind of Trial   | 1/5 Load Draught Progressive Trial |          |          |          |             | 1/2 Load Draught Progressive Trial |          |          |          |                   |       |
| Draught<br>Mean During<br>Trial                           | Fore                               |          | 3.213    |          |             |                                    |          | 5.424    |          |                   |       |
|   | Aft                                |          | 6.238    |          |             |                                    |          | 6.928    |          |                   |       |
|   | Mean                               |          | 4.726    |          |             |                                    |          | 6.176    |          |                   |       |
| Trim  | By the Stern                       |          | 3.025    |          |             |                                    |          | 1.304    |          |                   |       |
| Displacement (In tons)                                    |                                    |          | 7,921    |          |             |                                    |          | 10,754   |          |                   |       |
| Weather   |                                    |          | Cloudy   |          |             |                                    |          | Cloudy   |          |                   |       |
| Condition of Sea  |                                    |          | Smooth   |          |             |                                    |          | Smooth   |          |                   |       |
| Direction and Force of Wind                               |                                    |          | E-2      |          |             |                                    |          | NE-1     |          |                   |       |
| Kind of Load  | 1/4 Load                           | 1/2 Load | 3/4 Load | 4/4 Load | 109.6% Load | 3/4 Load                           | 1/2 Load | 1/4 Load | 4/4 Load | Normal Rev. 110.0 |       |
| Mile Post Used  |                                    |          | 1.000000 |          |             |                                    |          | 1.000000 |          |                   |       |
| Ship Speed in knots                                       | 12.483                             | 15.666   | 17.494   | 18.645   | 18.979      | 16.552                             | 15.060   | 12.198   | 18.231   |                   |       |
| Slip %  | —4.28                              | —2.20    | —1.90    | —0.88    | +0.67       | +0.27                              | —0.38    | —2.39    | +2.12    |                   |       |
| Engine Speed R.P.M.                                       | 73.9                               | 94.7     | 106.0    | 114.2    | 118.0       | 102.5                              | 92.7     | 73.6     | 115.0    | 110.4             |       |
| Mean Indicated Pressure KG/CM <sup>2</sup>                | Top                                | 2.822    | 3.741    | 4.505    | 5.452       | 5.813                              | 4.270    | 3.788    | 2.841    | 5.386             | 4.969 |
|   | Bottom                             | 1.856    | 2.874    | 3.567    | 4.359       | 4.805                              | 3.717    | 2.839    | 1.575    | 4.500             | 4.191 |
| I.H.P.  |                                    | 2823     | 5081     | 6938     | 9077        | 10140                              | 6614     | 4989     | 2670     | 9199              | 8176  |
| B.H.P.  |                                    | 2134     | 4185     | 5863     | 7811        | 8771                               | 5572     | 4104     | 1998     | 7920              | 6990  |
| Pressure KG/CM <sup>2</sup>                               | Fuel Oil                           | 400      | 488      | 580      | 675         | 745                                | 585      | 470      | 398      | 690               | 641   |
|   | Scavenging Air                     | 0.038    | 0.055    | 0.074    | 0.090       | 0.102                              | 0.068    | 0.055    | 0.036    | 0.094             | 0.085 |
| Exhaust Gas Temperature °C.                               |                                    | 123      | 170      | 220      | 268         | 298                                | 210      | 173      | 119      | 279               | 255   |
| Dynamo Output in K.W.                                     |                                    | 146.3    | 147.4    | 146.3    | 144.1       | 144.7                              | 146.3    | 146.9    | 147.5    | 150.3             | 142.1 |
| Power Required for necessary Aux. to Drive Main Eng. K.W. | Piston and Jacket C.Y. Pump        | 54.0     | 53.5     | 52.9     | 51.8        | 51.8                               | 50.7     | 49.5     | 49.0     | 50.7              | 49.5  |
|   | Lubricating Oil Pump               | 15.8     | 15.8     | 15.8     | 15.3        | 15.3                               | 13.1     | 13.1     | 13.1     | 12.8              | 12.8  |
|   | Sea Water Pump                     | 38.3     | 38.3     | 38.3     | 38.3        | 38.3                               | 40.5     | 40.5     | 40.5     | 40.5              | 40.5  |
|   | Total                              | 108.1    | 107.6    | 107.0    | 105.4       | 105.4                              | 104.3    | 103.1    | 102.6    | 104.0             | 102.8 |

# China as Electrical Machinery Market

## German, Japanese and British Competition

**O**F the markets of the Far East, China would seem to offer by far the most promising field to the exporter of electrical machinery at the present time, says the *Manchester Guardian Commercial*. The figures representing the value of electrical machinery imports of recent years by Japan, British Malaya, the Dutch East Indies, and China—the principal importing countries of the Far East—indicate a progressive decline since 1929-30 in the case of the three first mentioned countries, whereas Chinese imports have continued to rise year after year, apart from certain minor fluctuations. Moreover, the values of electrical machinery imports by Japan, British Malaya, and the Dutch East Indies (Java and Madura and the Outer Provinces) have an almost identical slope from 1929-30 onwards, exhibiting a sharp decline to 1932-33, followed by a slight rise in 1935, a feature common to all three sets of figures.

If the figures showing Japanese imports of electrical machinery are examined it will be noted that the drop has been practically continuous, falling from £1,028,000 in 1926 to a mere £78,000 in 1934, with a slight rise to £137,000 in 1935. Colossal as is this decline it is even more striking if we take the figures for 1924 when the total of these imports attained £1,907,000, of which no less than £1,411,000 was for electrical machinery from the United States, the country most affected by the decline of the Japanese electrical import market.

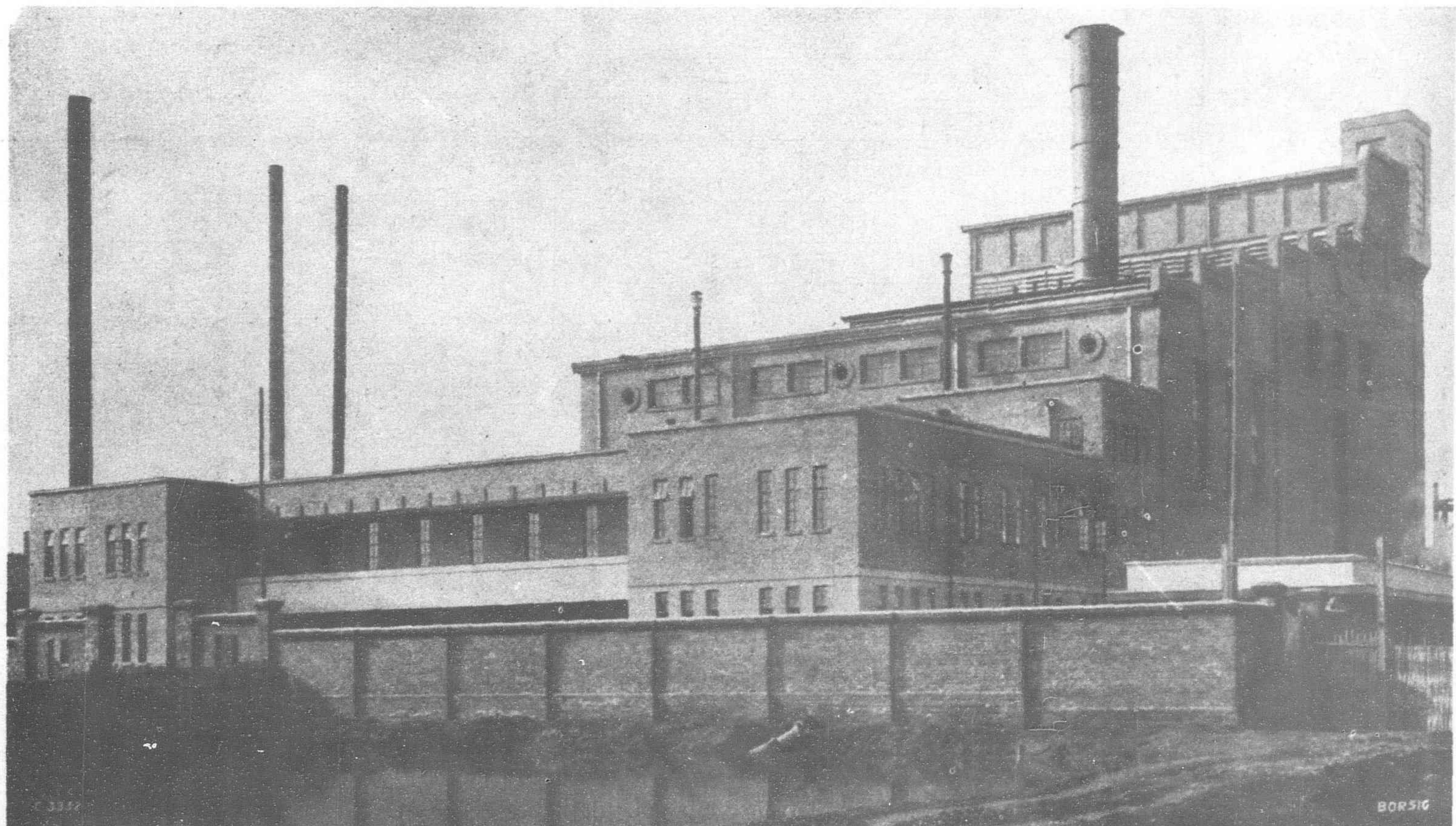
This situation has been brought about by the development of the Japanese electrical industry since the Great War, when Japan experienced great difficulty in obtaining from abroad the machinery and equipment necessary for her requirements. The Japanese electrical industry is to-day capable of producing electrical machinery of the highest capacities, and not only may one regard this market as one which is extremely unlikely to recover to any appreciable extent its former dimensions, but as a market virtually lost to the exporter. One may in fact expect rather to find Japan,

once her own requirements are adequately covered by home products, a powerful competitor in the electrical machinery markets of the Far East, as has already been the case with lamp bulbs and small electrical fittings.

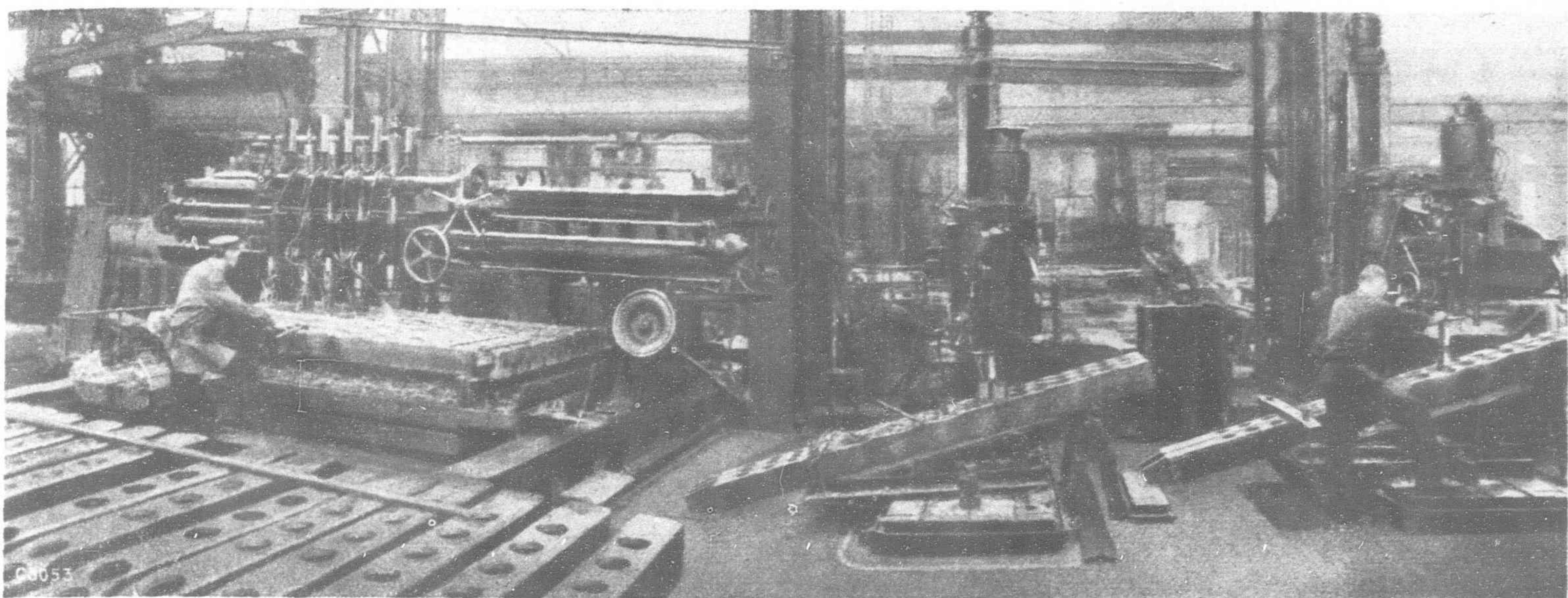
Turning to the curves for electrical machinery imports by British Malaya, the value of these imports is seen to have reached its maximum in 1930, when total imports aggregated £411,000, Great Britain supplying equipment to the value of £337,000, or 82 per cent of the total. Great Britain's share of this market, in fact, never fell below 66 per cent at any time during the eleven years 1925 to 1935, and with an average participation of 79 per cent over this period the United Kingdom may be said to enjoy a virtual monopoly of this market. During the three years 1933, 1934 and 1935, British participation was of the order of 90, 91 and 92 per cent. The total value of this market in the eleven years under review aggregated \$2,053,000 of which Great Britain shared to the extent of £1,625,000, other European countries and the United States with respective aggregates of only £187,000 and £158,000 being far behind.

Though the 1934 and 1935 figures show an improvement over those for the two previous years, there is much leeway to be made up, and imports are unlikely to reach the 1929 peak of £411,000 in the immediate future. Nevertheless, British Malaya constitutes a useful market for the British exporter of electrical machinery, and in view of the small volume of business done with Japan and the Dutch East Indies it is to-day the second most important market of the Far East to British manufacturers.

Great Britain has never enjoyed more than a minor share of the trade in electrical machinery with the Dutch East Indies, the principal sources of supply being Holland, Germany, and to a lesser degree the United States; these three countries cover at the present day 90 per cent of the demand.



General view of the power station of the Nanking-Hsiakwan Electricity Works, constructed and equipped by the German Firm Borsig



Manufacturing of headers in the workshop for the Nanking-Hsiakwan Electricity Works

Before 1934 the bulk of the Dutch Netherlands' requirements was covered by imports from Germany, with Holland the next largest supplying country. In 1934 and 1935 Holland was the most important source of supply. Though this market declined in a manner very similar to that of British Malaya (from £314,000 in 1929 to £45,000 in 1933), a fairly appreciable rise has occurred since then, and the figure of £146,000 for 1935 is the highest since 1930 with £259,000. That this market is a far more open one than British Malaya is evident from the considerable participation of Germany throughout the period between 1928 and 1935, and, in certain years, of the United States, too, the German and American share of this market aggregating over 54 per cent in 1935. With the partial recovery indicated by the 1934 and 1935 figures the participation of countries, apart from Holland, in this market should encourage British manufacturers of electrical machinery.

Compared with the three above-mentioned countries the case of China is altogether different. Here we have a market which, so far from falling, has continued to rise with certain slight fluctuations throughout the period of world-wide depression; and in spite of political troubles both at home and abroad. In the ten years from 1926 to 1935 the total value of electrical machinery imports by China rose from £133,000 to £438,000, the aggregate value of the imports over the period amounting to £2,989,000. The value of electrical machinery supplied to China by Great Britain during this period totalled £875,000 or 29 per cent of the total, compared with £707,000 (23½ per cent) for Germany, £493,000 (16½ per cent) for the United States, and £298,000 (10 per cent) for Japan. These four countries cover about 80 per cent of China's demand for electrical machinery. It is noteworthy that the Chinese electrical market was not affected to any appreciable degree by the slump, if we accept the figure of £284,000 for 1931, compared

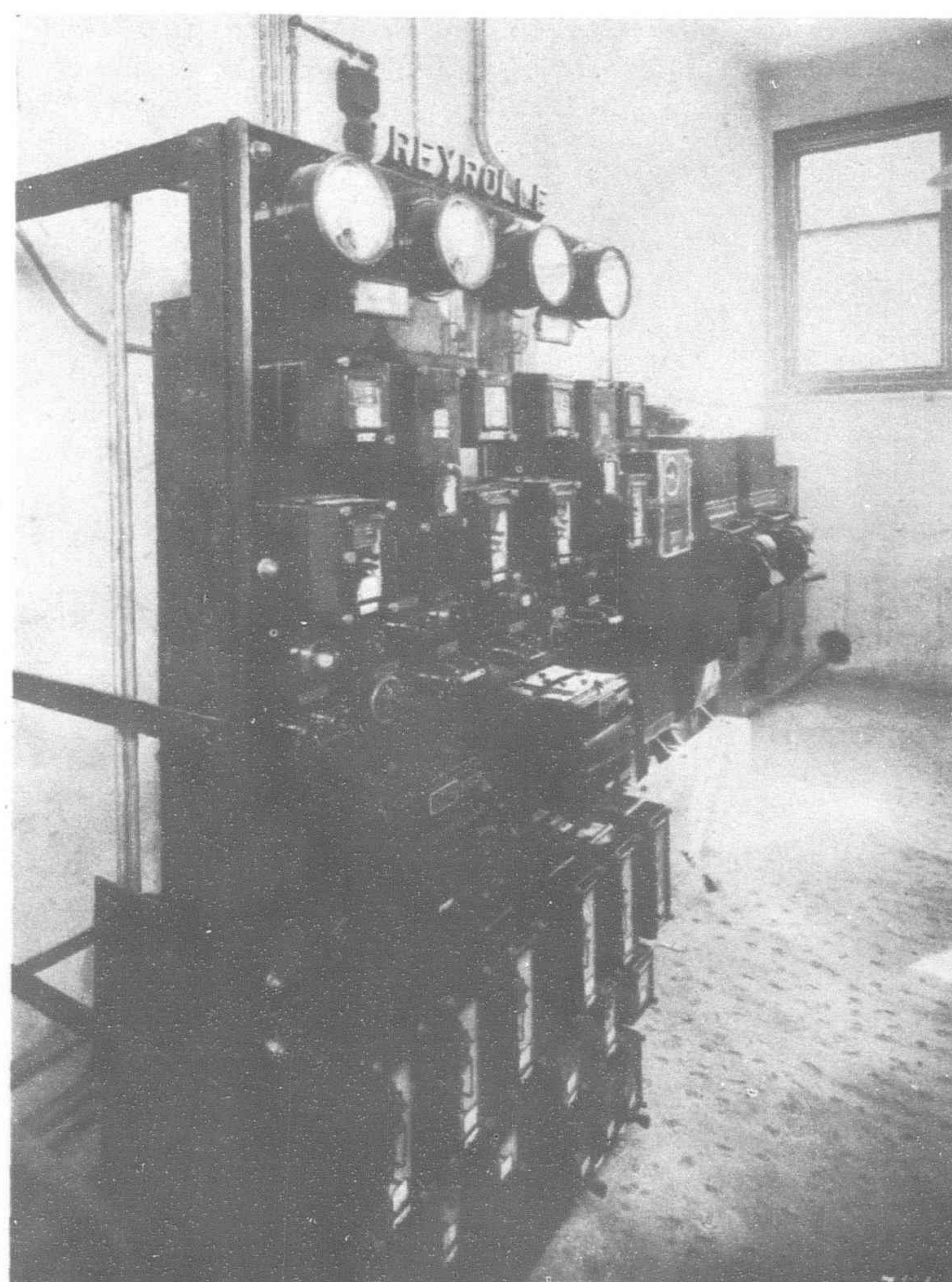
with £307,000 and £316,000 for the two previous years, whilst a marked increase in imports took place in 1932, with £422,000, the highest figure for imports previous to 1935, with £438,000.

China is, therefore, at the present day by far the most valuable market for electrical machinery in the Far East, her imports having, in fact, exceeded the combined total imports of electrical machinery by Japan, British Malaya, and the Dutch East Indies, which aggregated £276,000, £193,000, £232,000 and £385,000 in 1932, 1933, 1934 and 1935, comparing with £422,000, £322,000, £397,000 and £438,000 for China. Though during this four-year period Great Britain supplied China with electrical machinery to the value of

£439,000, she has ceased to be China's principal source of supply, Germany, with £531,000 as her aggregate over the four years, being first. The recent increase in the value of electrical machinery imported from Japan is also significant, the value of Japanese exports having more than doubled during 1931-1933 compared with 1926-1930.

Considerable as is this rate of increase, Germany can show an appreciably greater growth in the value of her electrical machinery exports to China, with an aggregate value since 1931 of £576,000 compared with £131,000 for the previous five years, a four-fold increase. The values of electrical machinery imports from the United Kingdom during each of these two five-year periods were £344,000 and \$531,000, as against £294,000 and £209,000 for the United States, the only one of the chief supplying countries that showed a decrease in the value of her exports to China during the second period.

It will be of interest to examine China's imports of electrical machinery from the returns for the several categories listed—electric generators and parts, electric motors and parts, transformers and parts, and other electrical machinery. To obtain an idea of the relative value of these imports and the participation of the main



Arrangement of switchgear comprising two control panels and main circuit-breakers, delivered by the British Firm Reyrolle to Chinese power stations

supplying countries it will be sufficient to take the figures for the past four years, 1932-1935, which can most conveniently be given in the form of tables.

Table I.—CHINA'S GENERATOR IMPORTS

|                       | 1932 | 1933 | 1934 | 1935 |
|-----------------------|------|------|------|------|
| (in thousands of £'s) |      |      |      |      |
| U.K.                  | 19   | 10   | 28   | 32   |
| Germany               | 71   | 17   | 34   | 11   |
| Sweden                | —    | —    | —    | —    |
| Japan                 | 2    | 7    | 3    | 3    |
| U.S.A.                | 5    | 12   | 13   | 6    |
| Total                 | 97   | 46   | 78   | 52   |

Table II.—CHINA'S MOTOR IMPORTS

|                       | 1932 | 1933 | 1934 | 1935 |
|-----------------------|------|------|------|------|
| (in thousands of £'s) |      |      |      |      |
| U.K.                  | 25   | 31   | 34   | 21   |
| Germany               | 54   | 41   | 41   | 46   |
| Sweden                | 20   | 18   | 17   | 18   |
| Japan                 | 18   | 10   | 19   | 31   |
| U.S.A.                | 14   | 13   | 19   | 13   |
| Total                 | 131  | 113  | 130  | 129  |

Table III.—CHINA'S TRANSFORMER IMPORTS

|                       | 1932 | 1933 | 1934 | 1935 |
|-----------------------|------|------|------|------|
| (in thousands of £'s) |      |      |      |      |
| U.K.                  | 25   | 17   | 18   | 16   |
| Germany               | 16   | 18   | 10   | 18   |
| Japan                 | 7    | 5    | 7    | 14   |
| U.S.A.                | 7    | 4    | 5    | 6    |
| Total                 | 55   | 44   | 40   | 54   |

Table IV.—CHINA'S OTHER ELECTRICAL MACHINERY IMPORTS

|                       | 1932 | 1933 | 1934 | 1935 |
|-----------------------|------|------|------|------|
| (in thousands of £'s) |      |      |      |      |
| U.K.                  | 35   | 38   | 48   | 50   |
| Germany               | 22   | 21   | 19   | 80   |
| Japan                 | 11   | 3    | 6    | 14   |
| U.S.A.                | 8    | 5    | 16   | 15   |
| Total                 | 76   | 67   | 89   | 159  |

During the period under review Germany was the chief source of supply for both generators and motors, with aggregates for the four years of £133,000 and £182,000 respectively, out of a total of £356,000 and £598,000, Great Britain's share being £89,000 and £111,000. The percentage participation of these two main sources of supply works out for generators at 38 and 25 per cent, the participations of the United States and Japan being of the order of £36,000 (10 per cent) and £15,000 (four per cent). Switzerland with an aggregate of £20,000, or six per cent, during the past four years is also a not an unimportant source of supply for generators.

In addition to Germany and Great Britain, other countries supplying electric motors to China during the period 1932-1935 were the United States with £59,000, Sweden with £73,000, and Japan with £78,000. Japan, it may be noted, supplied motors to the value of £31,000 in 1935 alone, a figure only exceeded by Germany, with £46,000.

Great Britain is the chief source of supply for transformers and has exported since 1932 transforming equipment to the value of £76,000, Germany coming next with £62,600, Japan third with £33,000, and the United States fourth with £22,000, out of an aggregate total for the four years of \$230,000.

Of the item "other electrical machinery," which covers switchgear, static and rotary converters, etc., Great Britain supplied during the four years £171,000, or 37 per cent, Germany £142,000 (30 per cent), the United States £44,000 (10 per cent), and Japan £34,000 (eight per cent), the total aggregate value being £436,000.

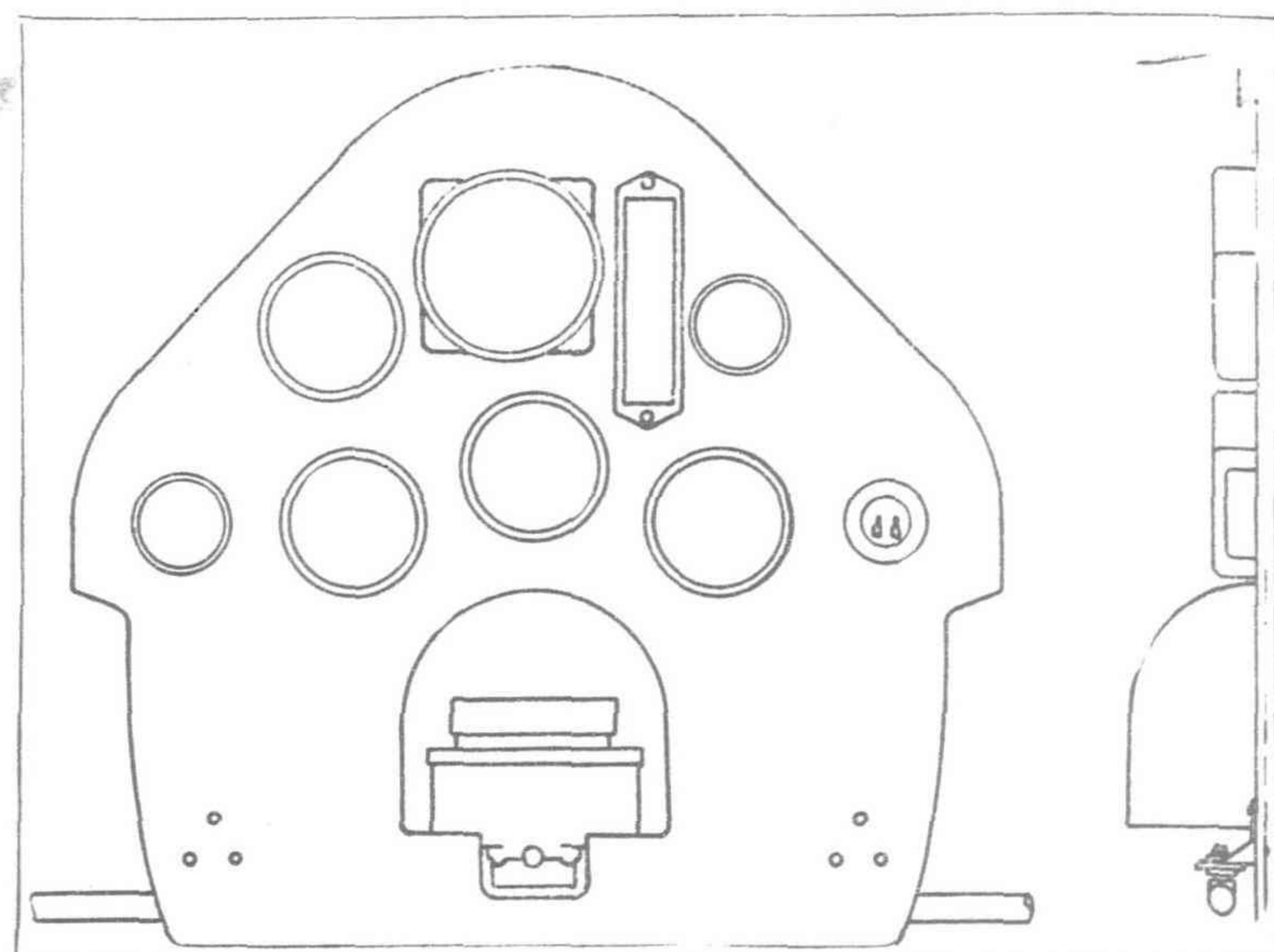
The value of the Chinese electrical machinery market to Great Britain for the four years under review has been of the order of £439,000 compared with £264,000 for British Malaya during the same period, whilst equipment of this kind exported to China from 1932 to 1935 by Germany, Japan, and the United States aggregated £531,000, £168,000 and £161,000 respectively in value.

## Rubber in Mining and Other Machinery

(Continued from page 154)

in opposite pairs to each half coupling. Actually the flexibility of this type of joint is so great that angular misalignment varying from three degrees to six degrees can be absorbed without loss of efficiency.

As there is no metal to metal movement the question of wear and lubrication do not arise, furthermore no additional protection is needed should grit and water come into contact with the coupling.



Typical Aeroplane Instrument Panel Mounted on Silentbloc Anti-Vibration Mountings

Undoubtedly the use of rubber in the manner described shows considerable promise in a number of directions, for due to consideration of space it is only possible to touch briefly upon a few outstanding examples of applications which have been well and truly tried.

It is stated that over 18,000,000 bushes of the Silentbloc type have been manufactured in England during the past few years and this fact is significant of the manner in which a large number of problems relating to both wear and vibration have been overcome with success by the scientific application of rubber.

## Fast Cargo Liners for Orient-Europe Service

(Continued from page 163)

The auxiliary boiler is of the single-ended cylindrical dry combustion-chamber type with a heating chamber utilizing exhaust gas and a furnace for oil-burning, which may be used simultaneously or alternatively as required. The heating surface for exhaust gas is about 160 sq. meters, whilst that for oil-burning is about 100 sq. meters, the working steam pressure being 6 kg. per sq. cm.

## Trial Results

The official trials of the *Akagi Maru* were carried out off Miye, near the port of Nagasaki, on August 19 and 22, 1936. On the one-fifth load draught official measured mile trials, a mean speed of 18.979 knots was attained with an engine output of 8,771 b.h.p., whilst on the half-load full power trials the average speed and engine output were 18.231 knots and 7,920 b.h.p.

At full power the fuel consumption of the main engine only as measured on the shop trials was about 170 grams per b.h.p. per hour, whilst that including the main engine and auxiliaries was about 173 grams per b.h.p. per hour.

A summary of the official trials is given in the accompanying table.

## Engineering Notes

### INDUSTRIAL

**BIG WOOL FACTORY.**—The South Manchurian Railway is building a big wool factory in Kalgan, it is reported. A large quantity of wool has already arrived from various parts of Mongolia for the new mill.

**JAPANESE IMPORTS.**—The prohibition on Japanese imports in Australia will be lifted temporarily to permit the entry of goods ordered before July 9.

This concession has been made for the purpose of maintaining employment in Australia.

**COPPER CABLE SALE.**—The passing of New York street railways is marked in the sale of six million pounds of copper P & L power cable to the Harvester Metal Inc., Empire State Building, New York City. W. J. Sullivan, for many years associated with the United States Steel Corp., is vice-President of Harvester Metal Inc.

**THE "EWO" BREWERY.**—The new "Ewo" Brewery at Shanghai will be completed shortly. Built under the direction of Jardine, Matheson & Co., Ltd., it embodies the most up-to-date equipment in a modern building of nine storeys. Situated on Tinghai Road, Yangtszepoo, the brewery comprises under one roof a complete brewing, storage and bottling plant, so compact as to secure both efficiency and economy. The layout of the equipment marks a definite advance that enables the various processes to be carried out with the minimum of handling.

### RAILWAYS

**LUNGHAI RAILWAY EXTENSION.**—The westward extension of the Lunghai Railway has been finally decided upon. The new line will start from Paochi and terminate at Chengtu, the capital of Szechuen. A site for locomotive workshop has been fixed at Sanchiao station, west of Sian. Work on the factory will begin this spring, with Belgian capital of \$5,000,000. The factory will be the largest on the western section of the Lunghai Railway.

**RAILWAY BUILDING.**—Chinese reports indicates that the project of constructing a railway between Tientsin and Shihchiachwang has replaced the proposed railway connecting Tsangchow and the latter city. Terms of contract to be concluded with the Japanese regarding capital and construction materials for the new line are being discussed. The Chinese authorities favor the Tientsin-Shihchiachwang railway, which will be 65 kilometers longer than the line originally contemplated, and it will have better through traffic facilities. Eight months' time and \$20,000,000 are said to be required to complete the railway.

### COMMUNICATIONS

**SHANGHAI TO LONDON.**—Mr. N. Belcher, a well-known businessman of Geelong, Australia, travelled from Sydney on the s.s. *Tanda en route* to Japan. From Japan he came to Shanghai on the s.s. *President Grant* arriving on November 24; thence travelled by C.N.A.C. plane to Hongkong on November 26, and left by the Imperial Airways on the following day, arriving in London on December 7.

**TOKYO-YOKOHAMA HIGHWAY.**—Construction of the 11.6 mile automobile highway between Tokyo and Yokohama has been inaugurated with elaborate ceremonies. The highway, which will cost Y.13,000,000 and take six years to build, is expected to save motorists more than 30 minutes between the two cities. Seventy-two feet wide in Kanagawa Prefecture and about 10 feet wider in Tokyo, the highway will be divided into three sections throughout by a double avenue of trees and the central section, which in Tokyo will measure 40 feet, will be reserved for high-speed traffic.

**TOKYO SUBWAY EXTENSIONS.**—Tokyo Subway Company has been planning to open tube between Shimbashi and Shinagawa, a distance of more than five kilometers, and arrangements have now been made with the Keihin Electric Line to start the work. For the purpose the Keihin Subway Company is to be founded with a capital of Y.10,000,000. Work on the subway is expected to start early this spring and the line to be opened in the first part of 1938. An extensive merger of the Tokyo Subway Company; Keihin Subway Company; the Keihin Electric Trolley Company, and the Shonan Electric Trolley Company is then contemplated. The new company will be capitalized at Y.76,000,000 and will become one of the largest electric trolley companies in Japan. On completion of the subway between Shimbashi and Shinagawa, the 83 kilometer section between Asakusa and Uraga in Kanagawa Prefecture will have through service.

### AVIATION

**NEW AIR ROUTES.**—Four new air routes, with a total length of 1,798 kilometers, was opened to traffic by the Japan Air Transport Company. The new lines will link Tokyo with Osaka, via Toyama; Tokyo with Niigata; Osaka with Masuye, via Tottori, and Osaka with Kochi, via Tokushima. Together with other lines operated by the concern, the total length of routes under its control will reach 8,000 kilometers.

Five lines operated by other firms and the 1,650 kilometer "loop" line to Kyushu, the total length of Japan's air routes will thus slightly exceed 10,000 kilometers.

## RICHARD FIRTH & SONS LTD.

Codes:  
ABC (5th  
Edition)  
and BENTLEY'S

"TEXTILES,"  
CLECKHEATON BROOK MILLS,

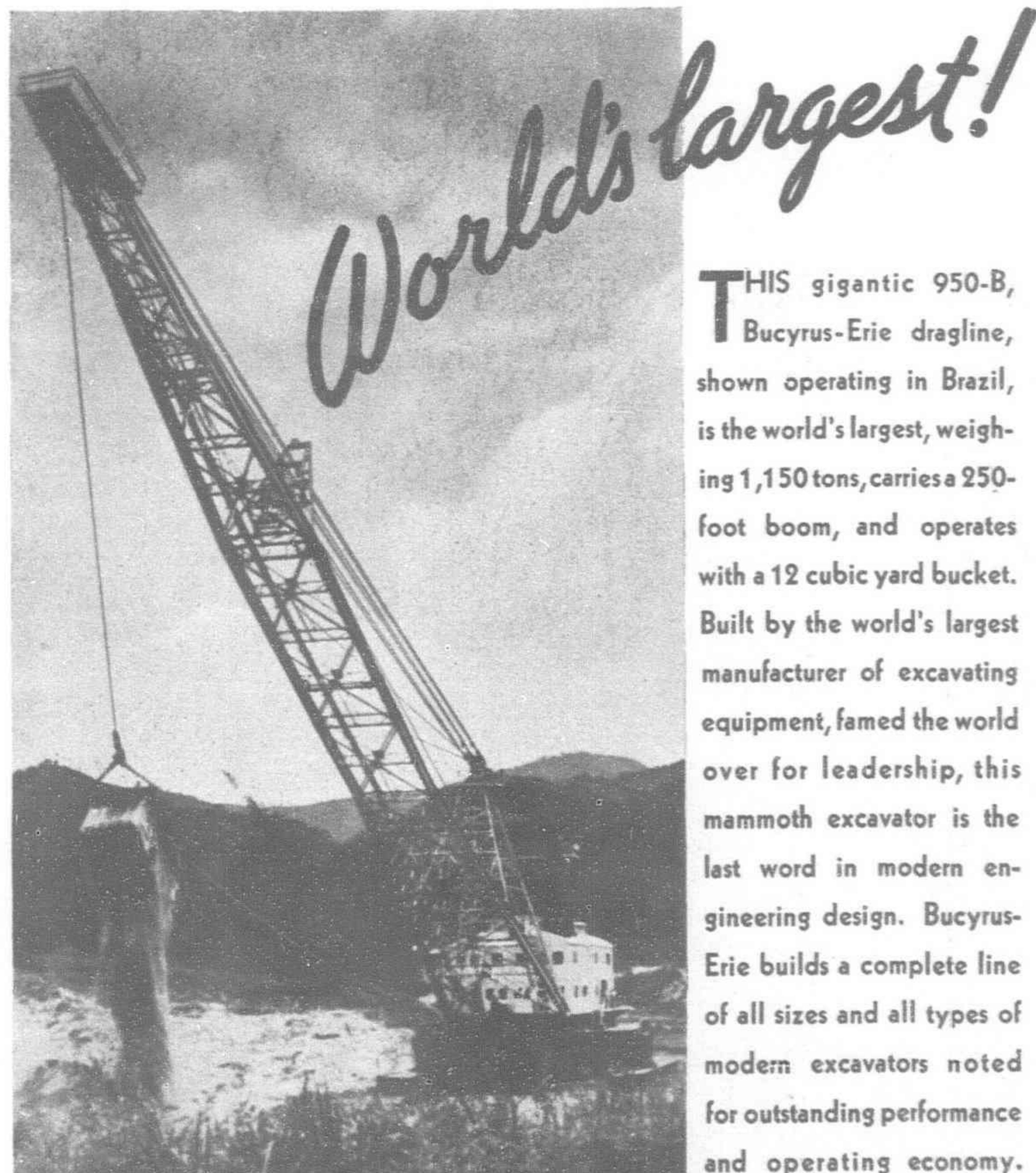
CLECKHEATON ENGLAND

## WOOLLEN AND WORSTED

### MACHINERY MAKERS

### AND EXPORTERS

*Sole Agents: THE JARDINE ENGINEERING CORPORATION LTD.*  
Shanghai, Tientsin and Branch Offices



**BUCYRUS - ERIE**

EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U.S.A.

**BUCYRUS  
ERIE**

## LEAGUE OF NATIONS

# Publications of the International Labour Office

### INTERNATIONAL LABOUR REVIEW

The *International Labour Review*, published monthly in English and in French by the International Labour Office (League of Nations), is widely read by those engaged in industry in many countries.

- Because it contains Special Articles by recognized Authorities on problems connected with the treatment of Labour in Industry;
- Because it summarizes important Reports and Enquiries on labour conditions in all countries, and thus makes their findings easily available in English;
- Because it contains up-to-date Statistics of Unemployment, Wages, Cost of Living, Hours of Labour, etc., on an international basis which are nowhere else available;
- Because its Bibliography is the most complete record of new Labour Laws and new Industrial Publications.

**Annual subscription \$10.00 Mex., Post free**

INTERNATIONAL LABOUR OFFICE publications are obtainable either from the INTERNATIONAL LABOUR OFFICE, GENEVA (Switzerland), or in China from Mr. Hai-Fong Cheng, 754 Bubbling Well Road, Shanghai, Tel: 30251, from International Labour Office (Nanking Branch), 202 Mo Ling Road, Nanking, Tel: 22983, or from the Commercial Press, Ltd., 211 Honan Road, Shanghai.

# SULZER BROTHERS

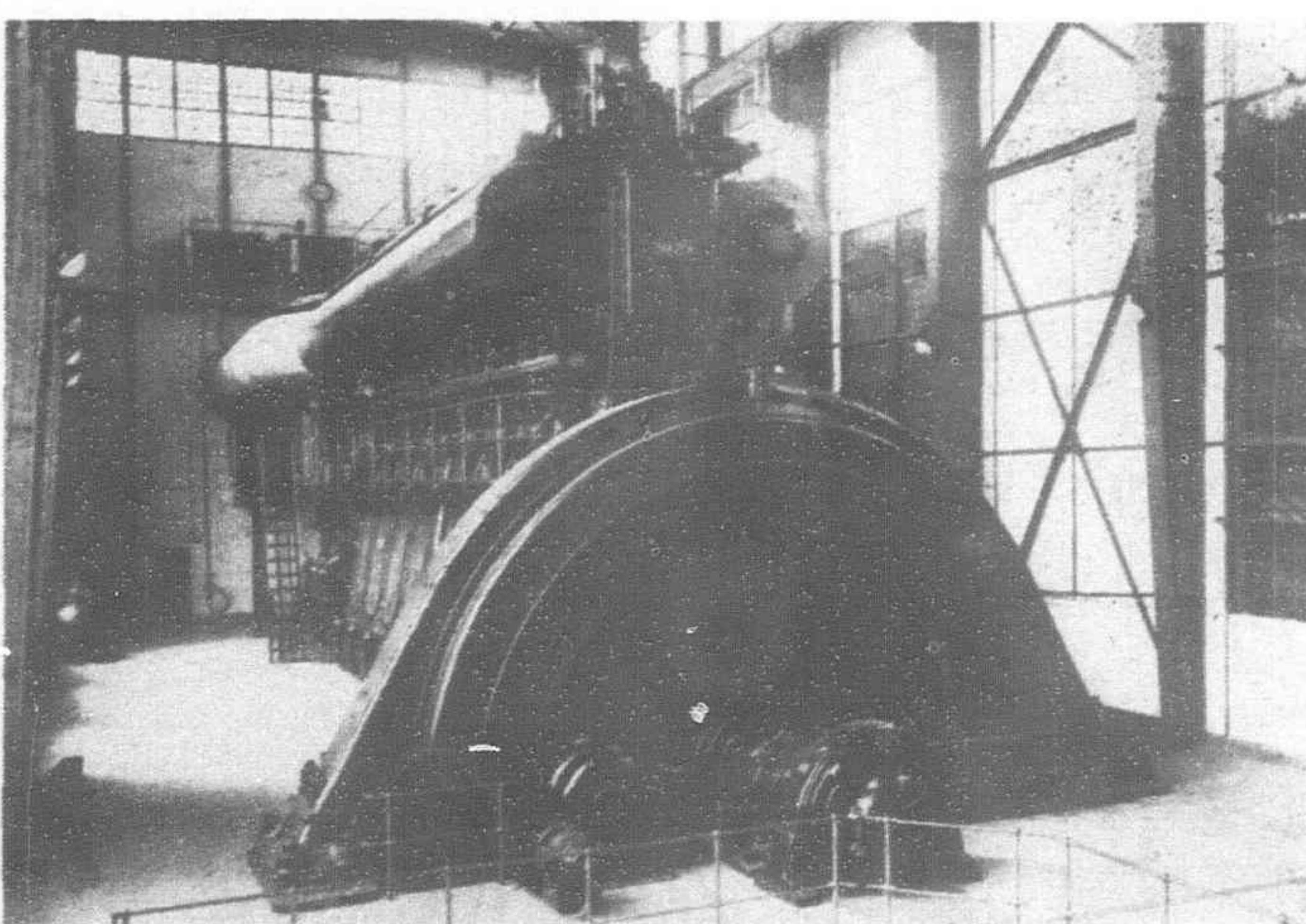
SHANGHAI ENGINEERING OFFICE

34 AVENUE EDWARD VII.

Telegraphic Address  
"SULZERBROS" SHANGHAI

Telephone 16512

本公司常備樣本供奉各界  
垂詢工程事務亦曷誠酬答  
上海愛多亞路三四號  
蘇爾壽工程事務所



Compagnie Francaise  
de Tramways et  
d'Eclairage Electriques  
de Shanghai  
New Power Station  
Lu Ka Wei  
equipped with a  
Sulzer double-acting,  
two cycle Diesel  
Engine, 11,400 b.h.p.

**WINTERTHUR. SWITZERLAND.**